

# The Iron Age

INDEX TO  
READING MATTER  
PAGE 32.

## A Review of the Hardware, Iron and Metal Trades.

INDEX TO  
ADVERTISEMENTS  
PAGE 19.

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*New York, Thursday, July 9, 1885.*

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## The Station "B" Chimney of the New York Steam Company.

among them one by Mr. Chas. E. Emery, giving details of the chimney constructed under his direction at Station B of the New

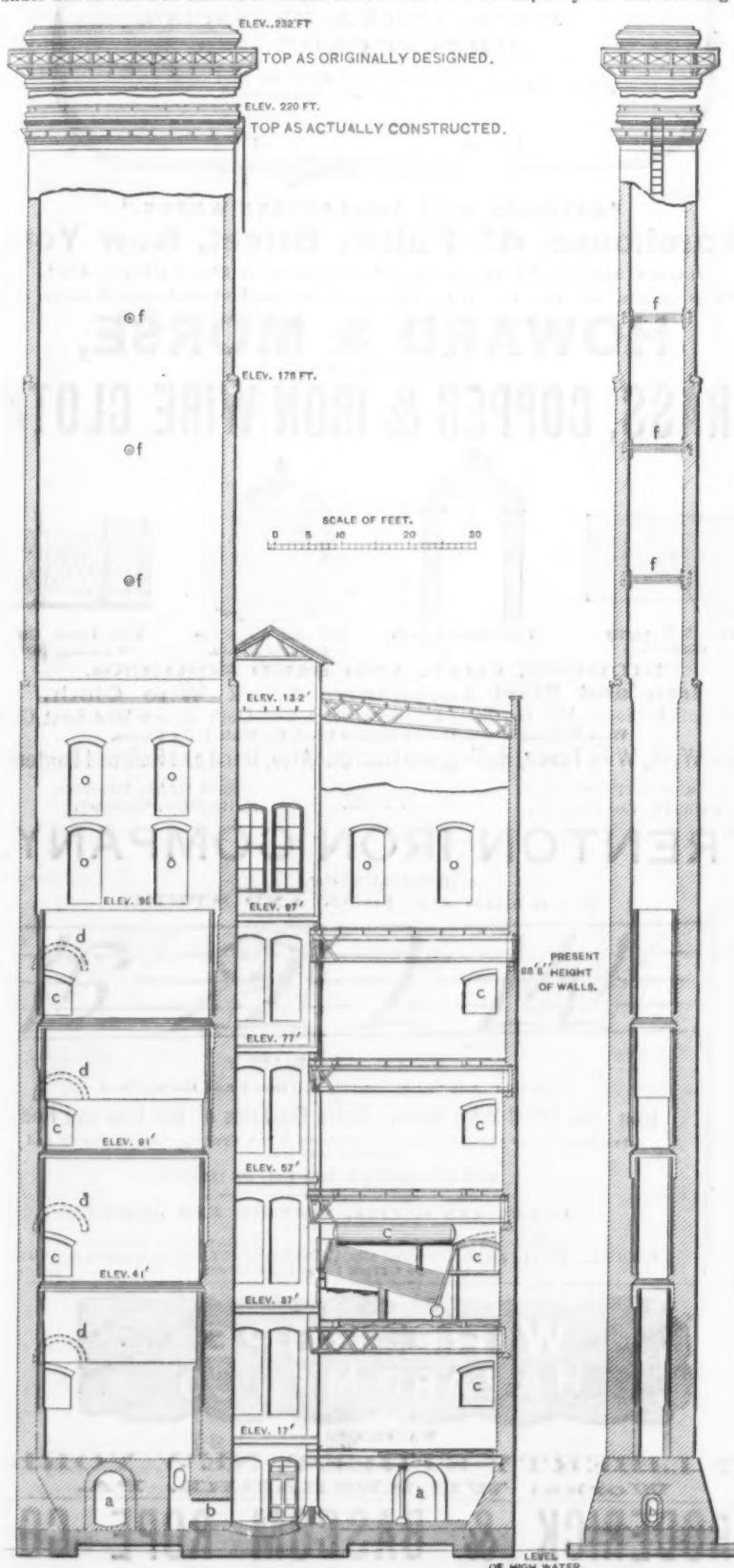
At the left are shown the floor beams in position, and on the right the side walls and steam drums C C of some of the boilers are represented. Fig. 1 shows on the right a vertical transverse section of the building, with a boiler in position on one floor, and at the left a transverse vertical section of one chimney. Fig. 2 shows a longitudinal section of the same chimney.

boilers are of the sectional type, manuf-

shown on plan, to 20 inches thick at

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Figs. 1 and 2.—Vertical Sections of Building and Chimney.

CHIMNEY OF STATION "B" OF THE NEW YORK STEAM COMPANY.

York Steam Company. From this paper we extract the following particulars.

The chimney may be called a "creature of circumstances," from the fact that it was necessary to erect boilers of 16,000 horse-power on an irregularly-shaped plot 75 feet in width, and on the average less than 120 feet deep, and the chimneys were necessarily shaped to suit the space available. To obtain proper floor-room the boilers were arranged in four tiers, each tier in a separate story 20 feet high, besides which the plans provide for a fifth story for coal storage and a basement for miscellaneous uses. Each floor is arranged for 16 boilers of 250 horse-power each, which are placed in two rows to face a central fireroom. There are two chimneys, one located between the boilers on each side of the fireroom as near the center of the building as the shape of the plot permitted. Fig. 3 is a plan view of one story of the building, and includes a horizontal section at a lower elevation through the vault under the sidewalk on Greenwich street; A A are the chimneys; B B the elevators; Y Y vertical steam drums; D D steam pipes to street; E E bases of columns of the elevated railroad in street; F F is the fire-room, and G a circular staircase. The locations of boilers are numbered from 1 to 16, inches, and a temporary roof applied, so that at present there are available only three stories for boilers and one above for coal storage. The south chimney has been practically completed. The north one is extended through the temporary roof and covered, but it is connected with the other by a sheet-iron casing at the level of the openings O O. There are now in place 35 boilers, aggregating 8750 horse-power. The coal is brought from the dock in carts and wagons, and dumped from the rear street into small cars in the basement of the rear buildings. These cars are run back to the elevators, lifted to the top of the main building, run out on tracks over coal bins and dumped, the coal descending by gravity through shutes in front of each alternate column, and flowing out as needed on the several fireroom floors, close alongside the fronts of the boilers. The ashes pass from the ash-pans down shutes in front of intermediate columns to cars in the basement. These cars are hoisted on the elevator to the roof of the rear building, run out on tracks to the front of the building, and the ashes dumped into a chute, from which they are loaded into carts on the street below. The

for the finished structure, and, before one-third of this pressure was reached, it became evident that the wet sand was compressible, and limited settlements took place which were not entirely uniform, as the chimney foundation received its full load before that caused by the boilers was received on the foundations of columns and walls. Eventually some narrow vertical cracks appeared, which relieved the strains, apparently without any material injury to the structure.

The concrete foundation under walls of building is 9 feet wide and 2 to 4 feet thick; under the chimney, 22 feet wide and 4 feet thick, and under the two rows of columns, 18½ feet wide and 3 feet thick. The two chimney foundations are joined by a brick invert. Concrete at the elevation of that under the side walls was first extended over the entire area of the building, and an additional layer, 1 foot thick, applied afterward, the surface of which forms the basement floor. The walls are racked out at the base to a width of 8 feet. The enlarged base of chimney is 20 feet wide. The walls of chimney, just above the footings, are 3 feet thick at the rear, 3 feet 8 inches on the sides, and 5 feet on the front (toward the other chimney). The walls decrease, as

tinues excessively keen, and makers who have not some special process of their own endeavor to meet the exigencies of the market by buying the rough cylinders or shells from Muntz's Metal Company and drawing them down to the required sizes. As the price of the rolled shells is 7d. per pound, while finished tubes are being sold and delivered at  $7\frac{1}{4}$ d., the profit on this sort of work is problematical. The *Ironmonger* reports that the number of makers who affect economical tube processes of their own is increasing, and among them it is just possible that one or two may be able ultimately to compete with Muntz's Company. The most promising at present are those of Mr. S. Walker and Heaton & Sons. Vivian & Co., Limited, have also a new process in preparation. Mr. Walker is so well satisfied with the results of his process that he is ex-

with the results of his process that he is extending his works and laying down additional machinery, including a 2000-ton press—the most powerful yet made—for drawing a 24-inch cylinder. He has been very busy of late on Government orders for copper casings for explosive shells, of which he has lately supplied some 40 or 50 tons to Woolwich, and he might have done more but for the breakdown of his most powerful press.

words, annealing does not necessarily improve the natural plate. Nevertheless, if holes are punched in plate, or plate has been flanged or set when warm, mild steel must be annealed, the annealing furnace temperature not being carried too high—a blood or cherry red is quite sufficient—the time in furnace not prolonged beyond the point that will secure thorough and equal temperature, and the cooling not too much hurried by contact with damp earth or a current of wind at low temperature. Neither should there be any attempt to "soften off" by cooling in a bed of sawdust or ashes. If the flanging, setting or any other distortion, such as bending in the rolls, can be done cold, there is no necessity for annealing either plates or bars, but all such setting is preferably done under the steady pressure of hydraulic tools.

draulic tools.

After a brief discussion, in which contradictory evidence was brought forward, the motion was carried that the sense of the meeting was that steel was the proper material for the inside of fire-boxes.

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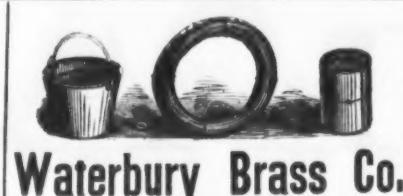
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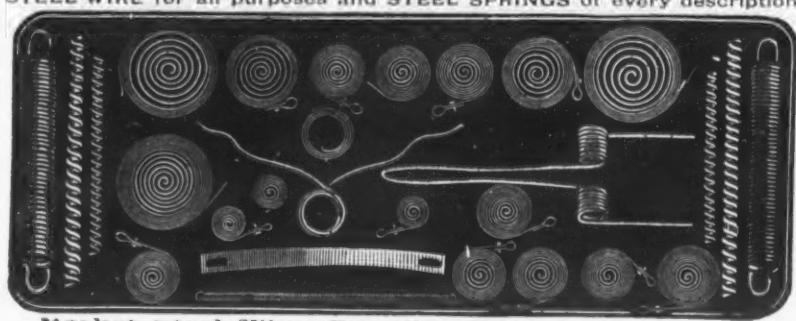
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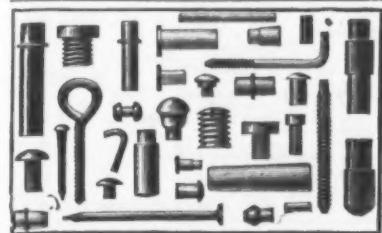
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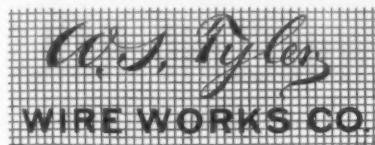
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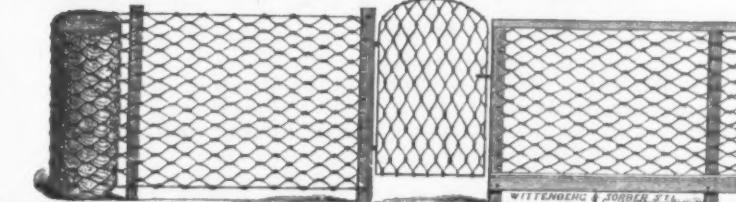
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The "Crinoline" Chimneys of the  
Cambria Iron Company.

At the suggestion of Mr. John Bogart, secretary of the American Society of Civil Engineers, a number of members of the society presented papers on the design and construction of chimneys containing features worthy of note. Among them was one by Mr. George Webb, of the Cambria Iron Company, on the "crinoline" chimneys at Johnstown, which we quote:

These chimneys are connected to the boiler-house by underground brick conduits, and are intended as "uptakes" for the unused gases. The surplus gases are used for generating steam, and but little is left after passing under the boilers. Sometimes the fires under the boilers must be reinforced with raw coal, in which case the chimneys convey some smoke. The ground is bad, and hence there is a deep foundation of masonry below the surface. From the entrance of the conduit to about 8 feet above the surface the base of the chimney is hexagonal, of hammered stone, surmounted by a cut-stone coping. Six 3-inch anchor bolts are built into this base, and provided with suitable nuts to hold down the base-plate 4 inches thick, and with an upward projecting rim 6 inches high around a circle 12 feet in diameter. From this base-plate it is 140 feet to the top of the chimney. At the top is a molded cast-iron plate similar to the base-plate, with the rim projecting downward, 10 feet 2 inches in diameter. The batter is therefore 22 inches in 140 feet. Between these two plates the "crinoline" is constructed. It consists of 16 vertical lines of ordinary wrought-iron railroad rails, 4-inch base, with the base outward, surrounded by 45 hoops. The rails may be in sections of any length which will allow of the splice being riveted to a hoop, care being taken to avoid having more than one rail splice on the same hoop. Well-selected old iron rails with good bases, or sound sections of No. 2 or No. 3 rails, are as good as any.

The hoops are of wrought iron rolled from iron  $\frac{3}{4}$  inch thick. Each hoop is in two pieces, bent cold to a true segment in a wedge-adjusting bending machine, which allows any desired delicacy of touch. The piece lies on edge while being bent, the "former" being more readily tried in that way. If bent hot the curve cannot be maintained while cooling. The two halves of each hoop are spliced on the inside with flat plates, secured with four rivets and one bolt in each end of each section, care being taken that at least three hoops shall intervene solid before another hoop splice is made between the same verticals. There are 45 hoops, the bottom one being near the base-plate projection, and therefore about 12 feet in diameter. The distance in the clear from this hoop to the next one above is 22 inches. The clear distance between each pair of hoops gradually increases from the bottom to the top, the distance in the clear between the top hoop and the next below being 54 inches. Each hoop is riveted to each rail with two rivets—one in the upper flat space of the hoop, and the other on the other flange of the rail in the lower flat space of the hoop.

The iron skeleton thus made is so stable that no scaffolding is used in construction. Two boards across a lower ring will hold a portable forge. A rail section is hauled up, put in place, adjusted and riveted; then others in the same way. The center opening of the chimney is  $\frac{1}{2}$  feet, which is preserved throughout. The bricks fill from this center opening to the inner side of the hoops, special bricks being molded to fit around the rail heads, and thus save time and waste of cutting. To save cutting bricks the masons carried the inside parallel with the outer batter, and when the inside got to 8 feet in the clear they set back on the inside to an even brick, and then followed the outer batter until the inner diameter reached 8 feet again, and so on. There are about 1000 bricks average to 1 foot in height of stack. Five bricklayers and nine laborers lined the first chimney built in 21 days, the next in  $18\frac{1}{2}$  days. They used no scaffolding but two scantlings and a few boards on the inside at convenient intervals, thus leaving a well-hole open the entire height. These were removed from the top downward after completion. A light iron ladder is riveted to, say, every third hoop the entire height. The convenience of this for construction, examination and repairs, if needed, is obvious.

The strength of this chimney is in the "crinoline." The bricks are merely for inclosure of the gases. Their mass is so small and the walls are so thin that they are never hot. The "crinoline" of the first chimney was built the entire height before the brick-work was begun. Some heavy storms occurred while it stood thus, and it never wavered.

A significant comment upon the present condition of the iron trade is found in the annual report of the managers of the Bethlehem Iron Company which says: "As foreshadowed to you in our last annual report, the ability to manufacture steel rails is so much in excess of the wants of the country that the prices at which they have been sold have not covered the cost of production, as is clearly shown by the financial report. We can see no immediate relief from severe and trying competition, unless we are able to produce rails considerably cheaper than our competitors, which is hardly to be expected. However, we have now nearly completed, at a very heavy cost, the large rail mill, which, when completed, will enable us to reduce the cost of production as well as to put steel in merchantable forms. When all these improvements are completed we hope to be able to somewhat cheapen our cost of production and possibly to secure a moderate profit on our business. Meanwhile, we believe it will be to the best interest of the stockholders and workmen, and certainly of the community, that the operations of the company should be continued, even if at some loss. Our competitors may have similar intentions as to manufacturing at less cost, and it will be for the future to demonstrate results. Certain it is that without a general revival in business the outlook for the coming year is not encouraging to either stockholders or workmen. During the past year several efforts have been made to limit



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FIG. 120.



FIG. 209.



FIG. 70.



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production, but these have failed more from the peculiar position of some of the mills than from their want of desire to limit production, and we see no prospect of any such arrangement being perfected."

## A New Form of Railroad Competition.

In the intense competition for business among American railways the effort of each line has been to offer greater inducements than its rivals in the way of lower rates, faster and finer trains, closer connections, less rehandling of freight, &c. But now, says the *Railway Age*, we have the novel spectacle of a road endeavoring to cut off business from other roads by raising its rates, lengthening the time and interrupting the connection of trains, and it is charged, neglecting the movement of freight cars received from other lines. The road which has inaugurated this new method of conducting business is the Canadian Pacific, and the explanation is as follows: The Canadian Pacific is now practically completed from Montreal westward around the north shore of Lake Superior to Winnipeg, and thence to the Rocky Mountains. It also has for some time had a steamer line across Lake Superior to Fort Arthur and thence by its main line westward to Winnipeg, &c. But thus far nearly all of its business from the United States and also from Eastern Canada has reached it over the St. Paul, Minneapolis and Manitoba Railway at Emerson or Gretna, at the international boundary line, from which points to Winnipeg it had only a very short haul. The distances to the last-named place by way of the Canadian Pacific are as follows: Emerson (St. P., M. & Ry.) to Winnipeg, 66 miles; Port Arthur (Lake Superior) to Winnipeg, 429 miles; Montreal to Winnipeg (all rail), 1,429 miles.Evidently the Canadian Pacific had rather haul business over its own line 1,429 miles, or even 429 miles, than only 66 miles. Consequently, it has now undertaken to force traffic out of its old channels by abolishing second-class rates from Emerson and Gretna and by otherwise discouraging freight and passenger business between Canadian points and Manitoba by that route. This, of course, is resented by all the railways between Detroit and the international boundary which have heretofore carried the large emigrant business from Eastern Canada to Manitoba and the Northwest Territory, and it also proves unpopular with shippers in Manitoba, who want only the shortest and cheapest route, and do not care to sacrifice their convenience or profits for the benefit of the Canadian Pacific Railway. A Winnipeg dispatch to the *Minneapolis Tribune* says:

"The change in the Canadian Pacific timetable here has given so much dissatisfaction that the City Council took action last night and passed the following resolution: 'That the city having bonused the Canadian Pacific Railway to very large extent, it feels that its citizens are entitled to some consideration at the hands of that corporation, and would, therefore, request that the said Canadian Pacific Railway so alter the running of their trains to the south as would be more convenient for our citizens by giving closer connection with trains at Gretna and Emerson.' One alderman suggested subsidizing a line of stages for passengers and a train of ox teams to carry freight to St. Vincent and Neche, so that a closer connection and quicker time could be made between Winnipeg and Minneapolis. The attempt to force traffic by the lake route is likely to lead to re-prisals. There is some talk of placing fast steamers on Red River to make close connection with Manitoba trains at St. Vincent."

The position of the Canadian Pacific managers is a peculiar one. Having completed a long and costly road through a country affording almost no local business, they, of course, consider it their duty to get all the through business for it that they can, and they feel that business to and from Canadian points naturally belongs to it, and ought not to be allowed to diverge from it and go over railways in the United States for the greater part of the distance. Moreover, the railway practically belongs to or is controlled by the Canadian Government, and political management is necessarily directed by different considerations from those which govern enterprises purely financial. The action of the Canadian Pacific in this matter, therefore, is not surprising, nor to be judged without fair consideration of the facts and circumstances. Nevertheless, while it may be defensible as a political and business right, it may perhaps be questioned as a matter of policy. Manitoba and the great northwest need immigrants and the visits of commercial travelers and tourists from the United States and the rest of the world in order to effect this development. Upon it depends the growth and prosperity of the great Canadian Pacific Railway enterprise. The Canadian Pacific should, of course, encourage passenger and freight traffic over the eastern portion of its line by all practicable means, but should it discourage the business which may seek to reach it through the highways of the United States?

The falling in during a fire of the upper stories of a building in Berlin, Germany, by the giving way of cast-iron pillars, recently, gave rise to some interesting developments, furnishing results somewhat contrary to general expectations. After the accident the Prussian police authorities, as *Engineering* informs us, issued an edict forbidding the use of cast-iron pillars in any inhabited building, but permitting the use of wrought-iron pillars. Cast iron, it was stated, could be used only in case such pillar was surrounded by a fixed casing of sheet iron, in such a manner that there was a good air space between the two. This edict, as might have been expected, provoked much criticism and opposition, and several authorities reasoned against it and made experiments to disprove the assumption on which it was based. Thus Professor Bauschinger, of Munich, made a long series of trials with pillars of both cast and wrought iron. He loaded them with the weights they are usually allowed to bear in buildings, and heated them first to 300° C., then to 600°, and finally to a red heat, and let a stream of cold water play on them, exactly as would have been the case in a fire being extinguished by fire-engines.

The cast-iron pillars were much damaged and cracked by this treatment, but continued to carry their loads quite safely, while those of wrought-iron were much bent before redness was reached, and so twisted when cold water was poured on them that they could not carry their loads. The conclusion naturally is that cast iron is really much safer for buildings than wrought iron. Pillars of other materials were also tested viz. natural stone, brick and concrete. The latter yielded the best results, resisting a fire of three hours' duration. Pillars of ordinary brick stood very well, but granite, sandstone and other natural stones did not show so much resistance. It is remarked very appropriately that, if the obnoxious edict of the Berlin police has done no other good, it seems at least to have set a good many people to work on this important subject.

## NEW PUBLICATIONS.

FRICTION AND LOST WORK IN MACHINERY. By Prof. R. H. Thurston. Size 6 x 9 1/2 inches, 353 pages. Published by Wiley &amp; Sons. Price, \$1.

Professor Thurston's work, as he remarks in the preface, contains the results of an attempt to exhibit the facts and laws involved in the waste of energy by friction in machinery and millwork. In the endeavor to reconcile the facts of common experience with the data supplied by the working library of the engineer, and in the attempt to secure additional essential experimental data relating to lubricated surfaces, Professor Thurston was led into a series of investigations which revealed new facts and established the inapplicability of the usually received values of the coefficients of friction to much of the most familiar work of the engineer. The enormous variations observed in their values, as produced by change of pressure, of speed and of temperature, and revealed by such investigations, compelled Professor Thurston to devise new apparatus and new methods of experiment, and finally led to the accumulation of a large mass of new and practically applicable data, the most important of which is published in this book. To make the work complete, it has been attempted to exhibit, as concisely as possible, the principles involved in the transmission of power and the performance of work, and in the waste of power by friction. It is shown also what are the methods of reducing such wastes, how to determine the purity and the intrinsic values of the unguents, and finally to ascertain how and to what extent variations of the magnitudes of these wastes are produced by variations of the conditions affecting the machinery exhibiting them. A large proportion of the work consists of new matter containing new data obtained by new investigations, and exhibiting variations from the formerly accepted laws of friction by new methods. Of this new matter a part has been published in Professor Thurston's earlier work on "Friction and Lubrication." The present work is much more extensive, the subject having been brought fully up to date. Even hurried inspection will convince the reader that there is much valuable matter in the book, and that its careful study will be fully repaid by profitable and interesting information.

THE MECHANICS OF MATERIALS. By Prof. Mansfield Merriman. Size 6 x 9 1/2 inches, 132 pages. Published by John Wiley &amp; Sons. Price, \$2.

This book supplies an elementary course of study in the resistance of materials and the mechanics of beams, columns and shafts, designed for the use of classes in technical schools. It should be preceded by a good training in mathematics and theoretical mechanics, and be followed by a special study of the properties of different qualities of materials, and by detailed exercises in construction and design. As the plan of the book is to deal mainly with the mechanics of the subject, extended tables of the results of tests on different kinds and qualities of materials are not given. Professor Merriman has endeavored not only to logically set forth the principles and theory of the subject, but to so arrange the matter that students will be encouraged and required to think for themselves. The problems which follow each article will prove useful for this purpose. In the chapters on flexure many problems relating to I-beams and other wrought-iron shapes are presented. The attempt has been made throughout to render the examples, exercises and problems of a practical nature and also of a character to illustrate the principles of the theory and the methods of investigation.

POCKET-BOOK OF MECHANICS AND ENGINEERING. By John W. Nystrom. Size 6 1/2 x 4 inches, 672 pages. Published by the J. B. Lippincott Company. Price, \$3.50.

The late Mr. Nystrom's pocket-book is so well known that it is unnecessary for us to go into details as to its arrangement and the ground covered by it. The matter accumulated since the last revision and incorporated in the eighteenth edition, before us, amounts to about 200 new pages, 159 tables and 251 illustrations. The whole number of illustrations in the book is now 600. The new subject matter is principally elements of mechanics, static and dynamic tables, steam engineering, belting, gearing, wire ropes of iron, steel and copper, electro-dynamics and physical sciences in general. The conversion of English and French weights and measures extends to 50 pages. The elements of mechanics are brought down to a simple form, with strict precision in the meaning of mechanical terms as used in the shop. The formulas and tables for belting are probably the most complete yet published on that subject. The subject of electro-dynamics is reduced to its simplest form.

Since the Washington Monument was built it has been repeatedly struck by lightning, and its experience in this respect has demonstrated that the measure of protection at first provided is inadequate. In our description of the monument published when it was nearly completed, we gave some account of the means adopted for conducting the electric fluid to the ground. The aluminium point of the capstone is connected with the metal-work of the stairway in the monument, and by this precaution it was supposed that the monument would escape injury. It has been determined, however, to



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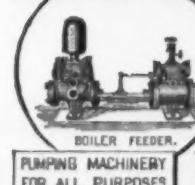
The characteristic feature of the invention is a curved blade, provided with saw-tooth cutters, and furnished with suitable working handles. It is our purpose to prosecute all infringers of our patent, and we have already commenced one suit, which is nearly ready for hearing, and are about commencing suits against other parties.

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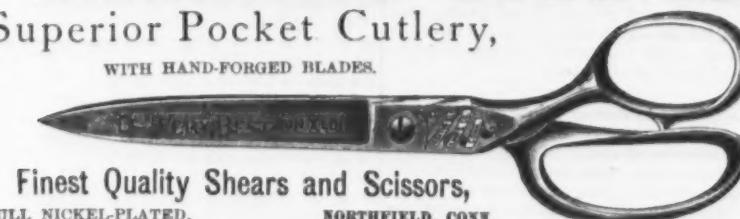


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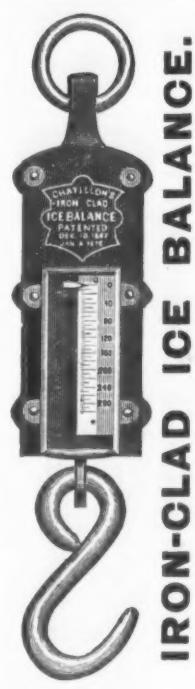
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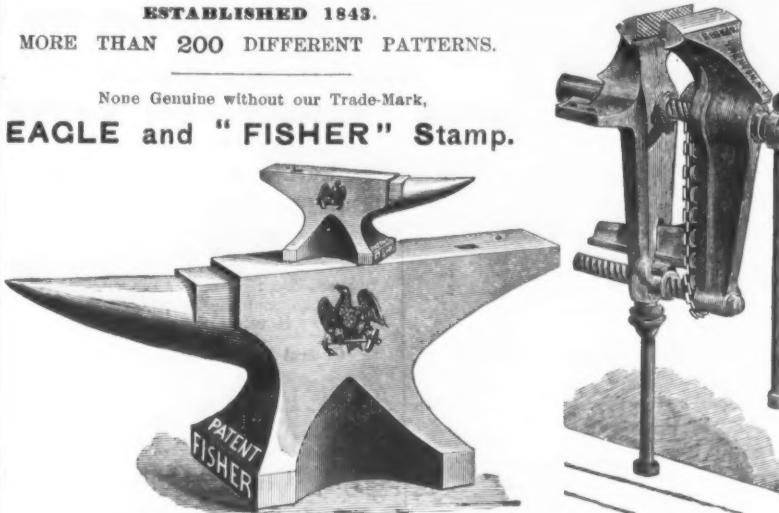

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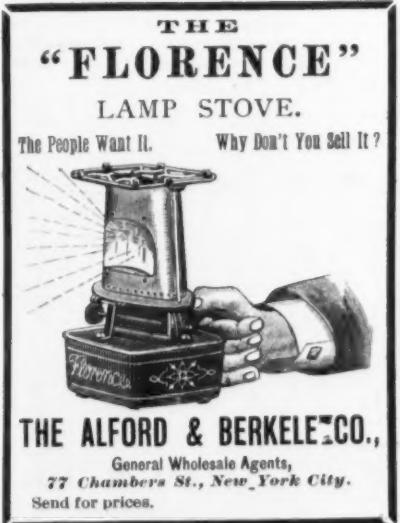
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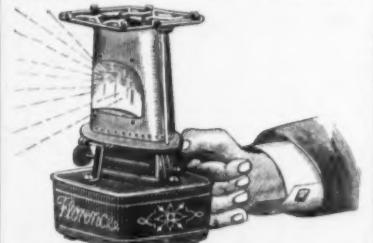
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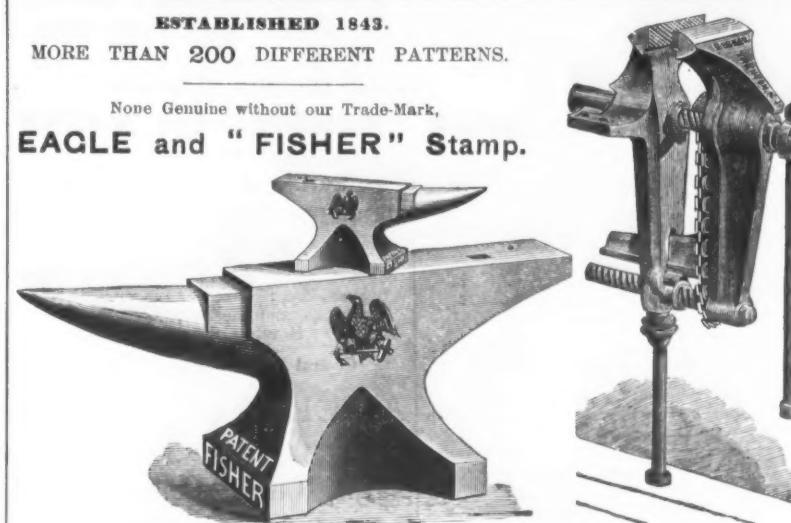
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provide the monument with additional points on the roof. Four copper rods  $\frac{3}{4}$  inch in thickness are to extend to the outside of the roof of the monument, one for each fall of the roof. These are to be in direct connection with the four copper rods which extend from the iron pillars which compose the framework of the elevator to the base of the capstone. The four additional rods thus provided will each terminate in seven branching gilded needle points. It has been determined by experience that the interior lightning rod apparatus is capable of conducting to the ground all the electricity likely to come from any storm, and it is believed that with the additional outside facilities above-mentioned all danger from damage from lightning will be averted. Including the aluminum points on the capstone there will be 29 lightning-rods on the roof of the monument. To put up these new lightning-rods a new scaffold to surround the roof was necessary.

**TRADE PUBLICATIONS.**
**Aluminum and Its Alloys.**

The Cowles Electric Smelting and Aluminum Company, of Cleveland, Ohio, have issued a small pamphlet of 10 pages, which begins by numerating 20 items of superiority of quality possessed by the Cowles aluminum bronze and aluminum silver. The most interesting, and apparently the only original, part of the pamphlet is the following record of tests made at the works of the Otis Iron and Steel Company:

Description.	Tensile strength per sq. inch.
Castings.	
10% Alumin. bronze.	80,210
5% Alumin. bronze.	48,610
2½% Alumin. bronze.	38,550
Castings.	
Aluminum silver...	102,000
Aluminum bronze...	104,550
Aluminum silver...	98,970
Wires.	
5% Alumin. bronze.	124,240
2½% Alumin. bronze.	103,130
7½% Alumin. bronze.	99,000
Silicon bronze.	115,780
Silicon bronze.	97,370
Si 1% Cu 96.	121,020
Si 3% Cu 97.	109,750
Si 2% Cu 97.	97,670
Si 1% Cu 97.	82,050
Castings.	
Alumino-silicon bronze	37,340
Alumino-silicon bronze	34,160
Telephone wire.	
Silicon bronze.	88,570
	Elongation.
	23%
	14%
	Conductivity 35% of pure copper.

**Fire-Engines.**

The La France Fire Engine Company, Elmira, N. Y., issue a new edition of their illustrated and descriptive catalogue, in which they call especial attention to their new and improved piston steam fire engine. In the preface they allude to the changes which have been made in the construction of their engines for the purpose of overcoming certain defects that had hitherto existed. The La France patent nest tube boiler is illustrated with a sectional view, and its valuable features are mentioned in the descriptive text accompanying the cut. Following some further descriptions is a list of the fixtures and supplies furnished with each engine. At the end of the pamphlet are two cuts showing general views of the La France engines. One is of a fire engine with double pump and steam cylinder, and the second of an engine with single pump and steam cylinder. On the last page is printed a list of old steam fire engines made by different manufacturers which have been rebuilt by the La France Company, the company making a specialty of this class of work.

**Boilers.**

Few catalogues which have thus far reached us have proved of greater practical value than that sent out by the Babcock & Wilcox Company, of New York, their latest issue, dated May, 1885, being no exception. In general appearance and arrangement it is not unlike the catalogues of the past few years, but examination will soon show that much valuable matter has been added and that it is worthy of careful study. Thus we find interesting paragraphs on economy in steam; the horse-power of boilers, priming, superheating, temperature of fire, boiler and furnace efficiency, and a host of allied subjects, giving altogether, in a condensed and readily accessible form, particulars which could otherwise be obtained only by careful and patient search. The catalogue, as usual, is profusely illustrated.

**Steam Pumping Machinery.**

The new catalogue of the Gordon & Maxwell Company, of Hamilton, Ohio, betrays an unusual amount of care in its arrangement, and will prove a profitable source of information, so far as pumps and their attachments are concerned. It is divided into 10 sections devoted to duplex pumps, their water and steam ends, railway water-station outfits, boiler feeders, pumping engines for water-works, mines, disposal of sewage, &c., and supplying convenient directions for ordering, tables of water pressures for different heights of column, loss by friction in pipes, and other particulars of equal interest. The catalogue contains 84 pages measuring  $9\frac{1}{2} \times 11\frac{1}{2}$  inches, and is fully illustrated.

**Coal-Handling Machinery.**

In point of interest and value Mr. C. W. Hunt's catalogue of coal-handling machinery, sent us a short time ago, compares most favorably with many of those which have come to our notice. In addition to its numerous engravings, furnishing elevations and details of coal tubs and storage sheds, elevators, automatic railways, screens, &c., we find reproductions from photographs of a number of plants erected by Mr. Hunt in different places. The descriptions, moreover, are clear and concise, and point out the essential features of the machinery in question. Mr. Hunt's works are at West New Brighton, N. Y., and his New York office at 111 Broadway.

**General Machinery.**

A small catalogue recently issued by Messrs. Chas. A. Luther & Co., of Pawtucket, R. I., supplies a brief outline of their

various manufactures, such as cloth-stretchers, model hand and bench vises, bolt cutters, circular saws, &c. Engravings of the articles described are annexed in every case adding not only to the convenience of the reader but also to the attractiveness of the matter presented.

**Punches, Shears and Boiler Rolls.**

An illustrated price list of the above machinery as manufactured by the Columbus Machine Company, of Columbus, Ohio, has been issued. It is in the form of a 14-page circular, supplying, in addition to the weights and prices of the machines, brief descriptions of their prominent features.

**Sawmill Machinery.**

Messrs. Clark Bros., of Belmont, N. Y., have issued a very neatly arranged and attractive catalogue devoted to sawmill machinery, and including, among other things, engines and boilers of different types. It is fully illustrated, and will no doubt prove convenient to those in the trade.

**Engines and Threshers.**

A small catalogue sent out by Messrs. J. O. Spencer, Son & Co., of Waterloo, N. Y., contains descriptions and illustrations of their engines and threshers, traction engines, hoisting drums, &c. The descriptions are brief and to the point, and cover the essential features of the machinery considered.

**The Philadelphia Mechanics' Home.**

There is about to be established in Philadelphia what is known as the Mechanics' Home. Buildings are being erected on the outskirts of the Park, and as soon as they are completed the institution—which is intended for the benefit of disabled and aged mechanics—will be in active operation. Provision for this institution was made nearly 30 years ago. Its founder was Mr. George Hayes, a partner in the firm of Dreer & Hayes, jewelers and gold chain-makers, and died in 1857. His will provided that, after certain legacies therein named had been paid, the residue of his estate should be used for the purpose of founding a retreat and home for disabled or aged and infirm and deserving American mechanics. The corporators who have been associated together for carrying out the provisions of this bequest include the names of prominent business men in Philadelphia, many of them being members of the same guild as Mr. Hayes. By the exercise of care in the investment of the moneys intrusted to them the corporators have been enabled to accumulate assets equivalent to the sum of \$100,000, besides the title to 16½ acres of land, on which the buildings above mentioned are now in process of erection.

There is to be a central building bearing the name of the founder of the institution, and to it are to be added from time to time detached buildings bearing the names of such donors as contribute the sums sufficient therefor. The detached buildings will be similar in kind to the cottages auxiliary to certain summer hotels. They will provide parlors, sleeping-rooms, &c., for the inmates, who will, however, dine in the main building. The auxiliary buildings will be connected with the main structure by covered corridors, which will afford pleasant promenades during inclement weather. With a desire to make the home as cheerful as possible, and free from the dullness in separable from an institution where aged people spend their declining days in idleness, provision in the way of work has been made. The grounds will afford occupation and amusement to those who desire to assist in gardening, while a large workshop equipped with tools is to be provided in the basement of the main building, where mechanics may not only amuse themselves, but perhaps do useful work at their old trades. The architect of the buildings in progress is Mr. T. P. Chandler.

**Anthracite-Coal Production.**—The second Geological Survey of Pennsylvania has just published advance copies of its report on the anthracite-coal region, which gives important information about the production and shipments of 1884. During that year there were 377 producing collieries. Nearly one-half of the whole number shipped their products over the Reading Railroad, that line carrying about 36 per cent. of the shipments. Six collieries had an annual production of over 300,000 tons each. The largest production of any one colliery was 506,631 tons from the Susquehanna No. 5, at Nanticoke, operated in the interest of the Pennsylvania Railroad. The total shipment in 1884 was 30,718,293 tons, and the total production 32,641,499 tons, or a million and a third less than in 1883. More than half of the total product came from the Lackawanna and Wyoming coal fields, while the Pottsville coal field, which, up to 1857, produced more than half the anthracite coal sent to market, produced in 1884 less than 10 per cent. of the total. Two-thirds of all the anthracite coal mined is consumed in Pennsylvania, New York and New Jersey. Only 16 per cent. goes to the New England States, less than 9 per cent. to the West, and a little over 4 per cent. to the South. Five hundred and seventy-five million tons of anthracite have been mined since 1820, when operations commenced. When the recent war broke out the product was just about one-fourth of what it is to day, and the business has about doubled within the last 15 years. All these facts and many others are clearly set forth in the report of the Geological Survey and upon an admirable map which accompanies it.

One of our commercial contemporaries, referring to recent overtures for trade in the shape of an agent to the Congo Association, the Congressional commission to South America, &c., expresses little confidence in efforts so inadequate, remarking as follows: "It may as well be admitted at once that we can never compete with the long-established Dutch, English and German houses, which control almost the entire African trade, until such times as we can undersell our rivals in that market. If we make cheaper goods we can get the customers."


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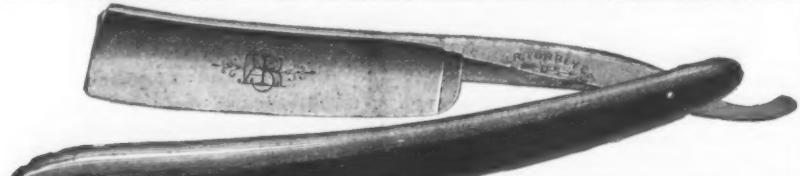
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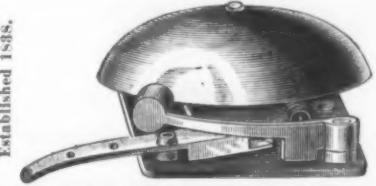
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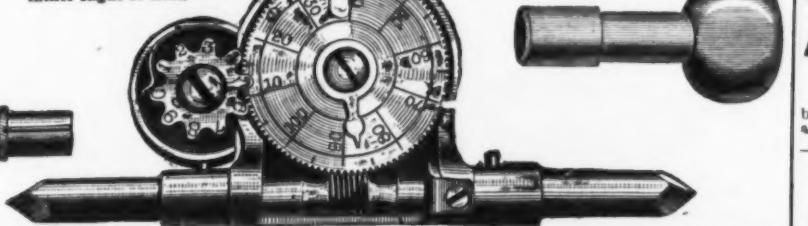
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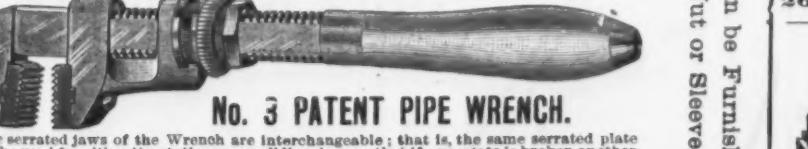


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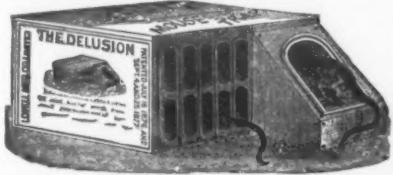
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No. 1620.

## English Letter.

(From Our Regular Correspondent.)

LONDON, June 22, 1885.

## THE WEEK

has been somewhat lively in its political aspects, but in an industrial and commercial sense it has been as "stale, flat, and unprofitable" as its numerous predecessors. For a fortnight or so past we have had the enormous misfortune (?) of being without a responsible Government. The Liberal Ministry resigned after their defeat in the House of Commons, and the Conservatives have since been engaged in forming a Government. In this they are generally reported to have been successful, but the Marquis of Salisbury—who is a very clever man and an astute politician—declines to take office unless he receives an assurance from the Liberal leaders that they will not expose him to useless worry and certain defeat in the House of Commons, where the Liberals have a majority. Here is the hitch, and unless the point is conceded it seems probable that the Liberals will have to resume the seals of office and do the best they can until the time for the general election. In a general way we should probably do as well without a Government as with one, but it happens that, while all this is going on, the budget bill remains in suspense, and operations in many industries are rendered most uncertain, owing to the circumstance that the new duties are not fixed. This applies especially to the beer, spirit and tobacco trades, as also in a less degree to tea and other articles of general consumption. These are positive drawbacks, while there are others arising from the timidity of a section of the public and the usual contraction of speculative operations during a political interregnum such as that now in existence. It is also no assistance to the iron and hardware trades that the end of the quarter should happen concurrently with the other causes of dullness. Further, the increase of the Russian tariff has added greatly to the difficulties of our manufacturers and exporters, who are scarcely less perplexed by the state of the tariff negotiations with Spain and sundry minor tariff movements in South America. On the whole, it cannot be said that things are progressing, although it would be scarcely accurate to say that there has been any further retrogression ; indeed, some of the current reports from Birmingham, Wolverhampton, Sheffield, &c., seem to indicate that there is a little more life in certain departments. The summer has now arrived and goods peculiar to the season are moving off with fair measure of freedom, particularly garden and traveling requisites. The appearance of cholera in Spain on a somewhat serious scale will in all probability be of advantage to our own seaside resorts and inland spas, inasmuch as the Britishers as well as many American tourists will limit their wanderings and spend their spare cash in Great Britain instead of on the Continent of Europe. In that sense the cholera scare abroad will be beneficial to us and will keep a great deal of money in the country, where it will almost exclusively be expended on British products and manufactures, instead of going to recipients who buy only a small proportion of British goods. At the same time it must be confessed that a very little cholera goes a long way with some people, and the outbreak in Spain is by no means a good reason why all the rest of Continental Europe should be given the universal cold shoulder. The statement made to your Washington representative that the Democrats intend to have another try at tariff reform has been perused with interest, but also with surprise, in this country, the general impression having been that the new rulers of your national destinies would prefer to let sleeping dogs lie. If they attempt to lower the tariff their efforts would naturally be watched with curiosity and interest here, but I am bound to say that no more intense feelings would be excited. Your market is at present of very slight value to us, and many of our best men of business would prefer, on the whole, that you should continue your protectionist policy, by which they believe you are restrained from serious competition in all the neutral markets of the world.

## FINANCIAL TROUBLES

are whispered about in London and elsewhere. Some of the rumors refer to the iron and steel trades, while others affect the tin-plate industry. In the last-named trade a stoppage took place last week, with liabilities equal to about £20,000, and others are said to be impending in which the debts are very considerable. In the absence of any concerted restriction of the trade such suspensions are not improbable, neither are they to be deeply regretted, seeing that they happened to firms who ought to have stopped long since. In the iron trade these rumors are unpleasantly persistent, but, so long as no official publicity takes place, I cannot very well be more precise in my allusions to them and their subjects.

## THE IRON MARKET

is very quiet in all directions, and is in all respects without changes of importance on the week. At Glasgow the market has been in a state of quietude throughout the week, and warrants have been both dull and lifeless, the closing price being 41/2 £/ton. Scotch special brands of pig iron are about 6d. lower on the week, and are not in strong request. Shipments of iron are on a poor scale, while the reserve stocks are increasing concurrently with enlarged importations into Scotland of Middlesboro' pig iron. From Middlesboro' there is no very cheering news, the market being very dull in all respects, with prices which are, nominally, founded on 32/3 @ 32/6 for No. 3 foundry pig. Shipments are tolerably good, but the local consumption is relatively light. On the West Coast hematite pigs are unchanged at about 43/4 £/ton for mixed lots. There is only a medium demand, and the outlook in the rail trade does not appear to encourage the idea that higher values are among the probabilities of the near future. The production is outside the demand, and stocks are growing larger weekly. In the other smelting districts everything is irregular and weak, the approaching close of the quarter having a tendency to emphasize the

disinclination of consumers to purchase for more than their actual current requirements. Heavy manufactured iron is in tolerable request for specific purposes, but the call for fencing wire and galvanized sheets is spasmodic, and prices are purely nominal. For ordinary finished iron there is not much doing, and few, if any, of the mills are working more than about half-time. Quotas are irregular at the figures mentioned in last week's report. For old materials I quote : Old double-headed iron rails, £2.10/0 @ £2.12/6; No. 1 heavy wrought scrap, £2 @ £2.2/6; old boiler tubes, £2; old leaf-spring steel, £2.7/6, and old cast iron, £2 1/2 ton, f.o.b. London or other good English port. Freight rates are as of late, the nominal rate for pig iron by ordinary steamer from Glasgow to New York being 1/2 £/ton. Steel is quiet in all directions, few of the Sheffield works having full work—indeed the majority of them have difficulty in finding their men work for three or four days weekly. At the same time there is a good demand for special forgings or castings, and a steady inquiry for high-class tool and engineering brands. The Bessemer and Siemens works are moderately well engaged on rolled sorts, especially ship plates. Steel rails are dull and unchanged on the basis of £4.15/0 £/ton for usual heavy sections.

## SCOTCH PIG IRON

has been dull and without more than a nominal amount of business stirring either in warrants or in makers' own brands. The latter are rather easier on the week, as will be seen by the appended quotations. There are 91 furnaces at work in Scotland, against 95 a year ago. In Connal's stores the quantity of pig iron now held is 599,348 tons (an increase of 758 tons last week, as compared with 589,457 tons this date last year. Shipments to date are 47,747 tons in arrears, while the importations into Scotland of Middleboro' pig iron are 57,052 tons ahead. Current prices :

	No. 1.	No. 3.
Gartsherrie, at Glasgow	48/6	45/
Coltness	49/6	48/3
Langloan	49/6	48/6
Summerlee	48/6	45/
Calder	52/6	45/
Carriaroe	47/	44/6
Clude	40/3	42/3
Monlank	41/0	39/6
Quarter	41/	39/
Govan, at Broonielaw	39/6	39/6
Shotts, at Leith	49/	48/6
Carron, at Grangemouth	52/6	47/
Kinnel, at Bo'ness	43/	42/6
Glengarnock, at Ardrossan	47/	41/6
Eglinton	42/	39/6
Dalmellington	44/	41/6

## MIDDLESBORO' PIG IRON

is no better than when last reported upon, although shipments for this month so far compare very favorably with those to the same date last month. In Connal's stores at Middleboro' there are 51,853 tons, an increase of 871 tons last week. That quantity is exclusive of the stocks in the railway stores and in makers' own yards. Current rates are about as under for G. M. B., f.o.b., at makers' wharves in the Tees :

No. 1 Foundry	35/0	Mottled	32/
3	34/	White	31/9
4	32/6	Refined Metal	40/
4	32/3	Kentledge	35/5
4	32/3	Cinder	30/

## WEST COAST HEMATITES

are unchanged on the basis of about 43/ for mixed lots in usual proportions, and makers' brands are 44/6 @ 45/ to 42/6 @ 43, according to numbers, &c. Last week's shipments included 8570 tons of pig iron and 3766 tons of steel rails.

## TIN PLATES

In London, although there does not appear to have been a great measure of business placed since my last, there is a steadier tone about the market, and, in view of the advance in the price of tin and the fact that the order books are well filled, makers are not open to take business below 13/6 for IC cokes or 16/ for steel charcoal tins. At Liverpool the advances have been pretty numerous, although they dropped off considerably at the end of last week. Buyers show signs of being in the market again for some good lines, but these are at certain limits which will not be touched by sellers for the present, at any rate. The question of the reduction of the make still hangs fire, as it is now understood that makers have relegated the question to report upon at the next quarterly meeting of their association, so that it may be said that the reduction-in-force has been played out, and it is more than likely that nothing more will be heard of it. If the makers knew how sensitive this market is on this question of reducing the make they would try to be more in touch with it, and regulate their proceedings in accordance therewith. The moment the reduction question was taken in hand seriously, as it was then thought, the tone of the market became firmer and the tendency altogether stronger, while, now the reduction question has vanished, it is all off again. Business has become quieter, and the tendency is to suggest lower prices. The inquiries for Bessemer steels and coke plates are still numerous, but business is restricted, because the prices offered do not suit such extended delivery as required. There is a fair demand for best steel plates (Siemens) in coke grades, with a few orders for the same in charcoal and best charcoal grades. The demand for ternes is becoming quite brisk again ; orders come in regularly now, but the strange part of it is that prices are very slow to move in an upward direction, even with such an improved demand as comparatively there is now. The great and rapid advance in the price of tin alone ought to send the price of ternes and ternes plates up considerably, but it has not been the case this time. It continues simply a question of supply and demand, as has been repeatedly pointed out, and though the prices have been ringed so often, it must be repeated again and again, until something effectual has been done. The prices are 13/6 @ 14/6 IC ; Bessemer, 13/9 @ 14/3 IC ; Siemens, 14/ @ 14/6, but with firm business in hand 3d. less is taken occasionally for coke tins, and Bessemer ternes are without change in price, ranging from 13/6 to 14/6 IC. Coke-tin wasters are in slightly better demand at from 12/ to 12/6.

The Camden Iron Works has received a contract for 250 miles of 20-inch pipe for a pipe-line from Pittsburgh to Philadelphia.

# H. D. SMITH & CO.,

Plantsville, Conn.,

MANUFACTURERS OF THE

## BEST QUALITY CARRIAGE MAKERS' HARDWARE,

Manufacture the Largest Variety of Forged Carriage Irons, of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

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### STEEL RAILS, T AND STREET.

OPEN HEARTH AND BESSEMER STEEL

### BLOOMS, SLABS AND BILLETS, Rolled and Hammered.

### HOMOGENEOUS STEEL BLOOMS, FOR BOILER PLATE.

### BLOOMS AND BILLETS, For Nails, Wire, and Bridge Bars.

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### SWITCHES AND SIGNALS, CROSSINGS, FROGS, SWITCHES SWITCH STANDS, OF ANY REQUIRED PATTERNS.

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## Norwich Bolt Works,

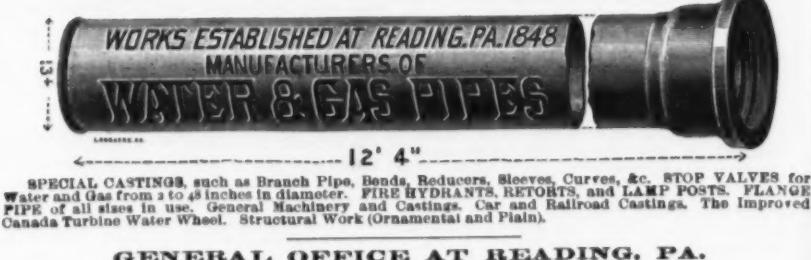
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Carriage Bolts, Whiffletree, and Fancy Head Bolts, Hand-Forged from Genuine Norway Iron. None in Market finer in quality or in finish. Prices as low as for Inferior Work.

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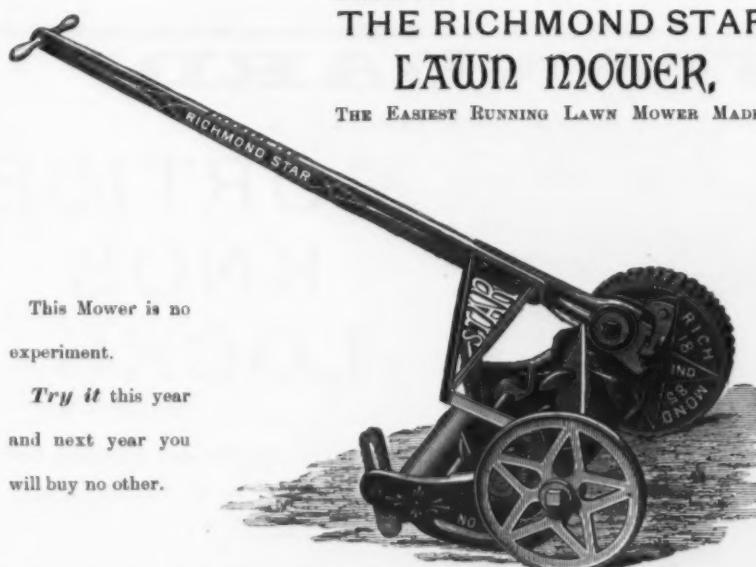


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AGENTS FOR

### THE RICHMOND STAR LAWN MOWER,

THE EASIEST RUNNING LAWN MOWER MADE.



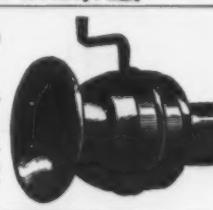
This Mower is no  
experiment.

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and next year you  
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Our friends will do themselves a favor by corresponding with us for  
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WE SHIP ALL GOODS FROM THE FACTORY AND AT FACTORY PRICES.  
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### The Curtis Steam Trap.



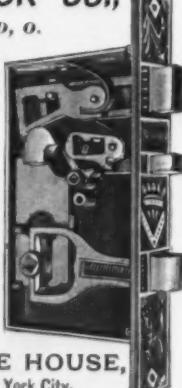
Has automatic air discharge; has a differential opening, thus discharging all air before the steam is very accessible for cleaning, the valve being on the outside. Send for circular. Manufactured by the CURTIS REGULATOR CO., 61 Beverly St., BOSTON, MASS. GENERAL AGENCIES: 109 Liberty St., N. Y.; 19 N. 7th St., Philadelphia; 46-48 St. Mark's St., Chicago; 49 Baldwin St., Baltimore; 24 1/2 St., Pittsburgh, Pa.; 745 Craig St., Montreal; 707 Market St., St. Louis.

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SOMETHING NEW.

The most complete lock in the market for the money, being absolutely burglar proof.

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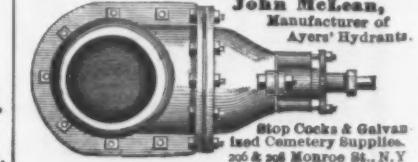
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Manufacturers of Copper, Brass and Iron Rivets; Common and Swedes Iron, Leathered, Carpet, Lace and Gimp Tacks; Finishing, Hungarian, Trunk, Clout and Cigar Box Nails, &c. Rivets made to order.

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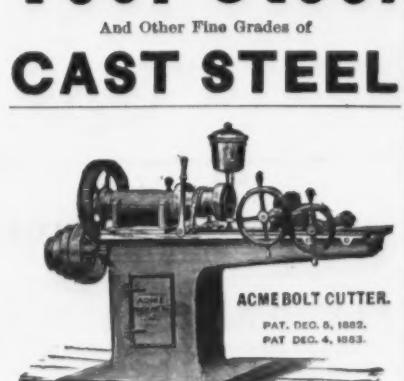
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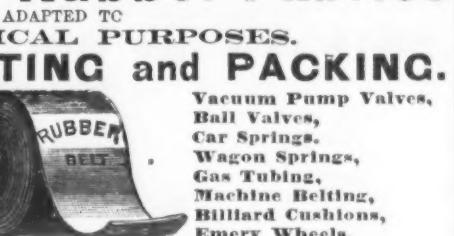
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CLEVELAND, OHIO.PHOSPHOR TIN.  
By using my Phosphor Tin, manufacturers can  
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This company manufactured the immense DRIVING and ELEVATOR BELTS for the Buckingham Elevator Company, and have supplied the largest number of BELTS to the great elevators of the Armour, Dole &amp; Co. of Chicago; Vanderbilt's Elevators for the N. Y. Central &amp; Hudson River R. R., the great Elevators of the Penna., and Erie Railroads, of Jersey City and Hoboken; Dow's Stores, of Brooklyn, and many others—in fact, the largest BELTS for the largest Elevators in the world.

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EMERY WHEELSSection of Emery  
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LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED.

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**BUFFALO CUPOLA & FORGE BLOWERS**



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Manufacturers of the celebrated Snell's Ship Augers, Ship Auger Pattern Car Bits, Ship Auger Bits and Ship Augers with extra length twist, for Bridge Builders', Dock Builders', Railroad use, and especially designed for Car Builders and Millwrights, both with and without screws. These goods are produced from a special steel by new and improved machinery, the labor being performed by skilled mechanics, and they are of superior quality and finish, and fully warranted in every particular, and are of the highest standard of perfection attainable.

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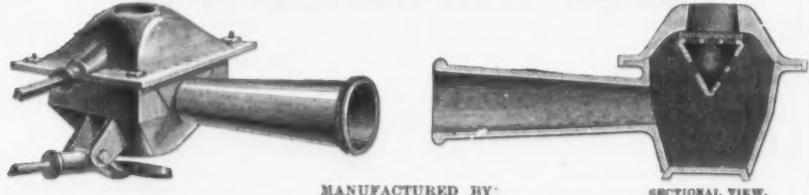
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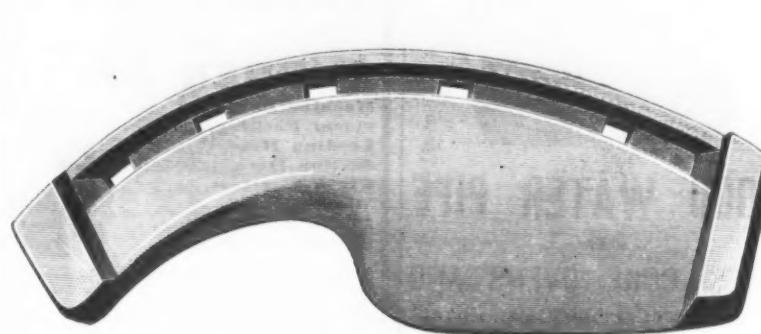
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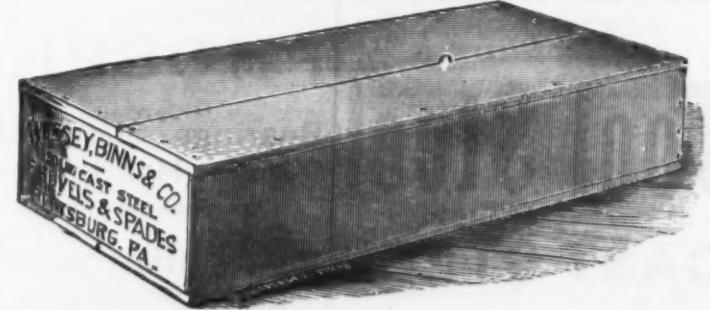
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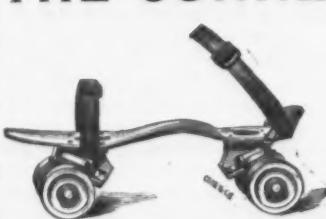
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### The Manufacture of Screws in Rhode Island.

It is not known, says the Providence Journal, when screws were first made and brought into use. The first instance known of machinery being applied to the making of screws was in France, in 1569, by a man named Besson, who contrived a screw-cutting gauge to be used in a lathe. The early method was to make the heads by pinching the blanks while red-hot between dies, and then to form the threads by the process of filing. In 1841 Besson's device was improved by Hindley, a watchmaker of York, England, and for a long time the watchmakers of that country used this device in making the small screws used in their work. The first English patent appears to have been issued to Job and Miles Wyatt, in 1760, for three machines: One for making blanks, another for nicking the heads, and a third for cutting the threads. Between that date and 1840 about 100 patents were issued, only one of which is worthy of notice, namely, that of Miles Berry, dated January 28, 1837, which was for a gimlet-pointed screw. The first American patent was issued December 14, 1798, to David Wilkinson, a celebrated mechanic of Rhode Island. The next American patent was dated March 23, 1813, and was issued to Jacob Perkins, of Newburyport, Mass. In that year, also, a patent was granted to Jacob Sloat, of Ramapo, N. Y. At the extensive nail and iron works of the Piersons, established in 1808, Thomas W. Harvey, in 1831, applied the toggle joint to the headings of screws, rivets and spikes. In 1834 Mr. Harvey entered into partnership with Frederick Goodell, a cotton manufacturer of Ramapo, and established a small screw manufactory at Poughkeepsie, and early the next year Mr. Harvey invented machines for heading, nicking and shaving screws. These and a thread-cutting machine purchased from its inventors, Jacob Sloat and Thomas Springsteen, were successfully operated, producing a gimlet-pointed screw.

In 1837 the attention of some persons in Providence was directed to the manufacture of screws. A company was organized and was chartered in January, 1838, with a capital of \$20,000, under the name of the Providence Screw Company. The principal corporator and manager was Clement O. Head, and it was claimed that the machinery used was his invention. The company continued in operation until 1840, when their mill was burned, and the enterprise, which had been unprofitable, was abandoned. In the autumn of 1838 another company was formed and chartered at the Eagle Screw Company. The corporators included John Gorham, James Humphreys, John Proctor, Pardon Miller, William G. Angell, Jabez Gorham and 11 others. The authorized capital was \$75,000. William G. Angell was made agent of the company, and James Humphreys, an iron founder and machinist, was chosen treasurer. The Eagle Screw Company had but fairly got under way when a suit was brought against it for infringing on the Pierson patent in the machinery it had purchased from the Providence Screw Company. An adverse judgment was rendered, with damages to the amount of \$20,000, the payment of which sum, with legal expenses, absorbed more than half of the working capital. After this the company's business made slow progress, and until about 1850 was carried on only by the most strenuous exertion. In 1849 a screw had been made by the New England Screw Company, of Providence, which, modeled on one of French manufacture, was tapered to a point. Mr. Angell saw that the old style of blunt screws, for the making of which alone his machinery was adapted, would soon be supplanted by this new style of pointed screws, but his company was not in a pecuniary condition to change all the thread-cutting machines. At this juncture, however, the machine of Thomas J. Sloan, of New York, was offered Mr. Angell, which, though patented a number of years before, had not yet found a purchaser. Although defective, Mr. Angell saw that the principle of the machine could be made available. Mr. Angell devoted his resources to conform his machines to the principle of Sloan's machine, and was soon ready to supply the screw in its new form. From this period the company began to prosper and grow rapidly. In 1854 its capital stock by act of Legislature was increased to \$500,000. The building and machinery were enlarged and in 1860 the company occupied all the buildings now on the south side of Stevens street. A consolidation of the two companies, the New England and the Eagle, was soon effected, the new company taking the name of the American Screw Company. Its nominal capital was \$1,000,000. It may be sufficient to say that the New England Company was chartered in 1840, with a capital of \$20,000. Its corporators were Cullen Whipple, Henry Hopkins, Hezekiah Willard and seven others. Whipple was a skillful and inventive mechanician. He devised a machine for the cutting of threads of screws, which was patented August 18, 1842; he also invented a machine for shaving the heads, which was patented April 6, 1843, and a device for removing the burrs left in cutting the slots in the heads, April 10, 1843. These patents were assigned to the New England Screw Company, as well as seven other machines or devices for improving the manufacture of screws. In the autumn of 1841 the stock was increased to \$50,000. Additional subscribers were obtained, and a large wooden building on the corner of Eddy and Friendship streets, formerly occupied as the stables of the old line of stages between Providence and Boston, was leased. Alexander Hodges was appointed treasurer and agent. By October, 1845, the capital stock had been increased to \$300,000. In the spring of 1849 the beginning of the manufacture of pointed screws resulted in a complete revolution in the business. Additional facilities were needed, and a large area adjoining the premises of the Providence Machine Company, on Eddy street, 200 feet on the street and 1500 feet deep, was purchased. In 1854 additional buildings had been constructed, and included the main building on Atlantic (now Henderson) street, and the ell on Eddy street.

When the two companies consolidated as the American Screw Company, William G. Angell was chosen president, and Edwin G. Angell, his son, was elected treasurer. In 1860 the property of the Utica Screw Company, of Utica, N. Y., was bought by the American Screw Company, which, in the following year, also purchased the property of the Bay State Screw Company, at Taunton, Mass. The Bay State Company had been organized in 1852, and was principally engaged in manufacturing rivets, machine screws, stove and carriage screws and other ironwork, in which class of work it had attained some success. For the next 10 years the progress of the American Screw Company was constant and rapid. During this period it had the advantage of the high price of gold, which was almost prohibitory of importation. No change was made in the nominal capital, however, until 1870, when it was increased to \$3,250,000. In few lines of manufacture was there so small a percentage of successful concerns. It is stated that of 70 concerns engaged in the manufacture of screws, besides the two companies comprising the American Screw Company, only the Bay State, at Taunton, and the National, at Hartford, were fairly successful.

Mr. William G. Angell, who was the guiding spirit of the enterprise, and to whom the company in a large degree owed its success, died on May 13, 1870, and was succeeded as president and executive manager by his son, Edwin G. Angell, who still holds these positions. The period following Mr. Angell's death, as most merchants know, was characterized by a severe business depression. Building operations were diminished, which lessened the demand for the company's products. In spite of this, however, the works in Providence were enlarged, and in 1873 arrangements were made to transfer the business and machinery of the Bay State Company to Providence. The large and conveniently arranged building on the north side of Stevens street was erected and has since been known as the Bay State Mill, the building on the south side of the street being called the Eagle Mill. Important patents were taken out, one of which, dated May 30, 1876, greatly changed the form of the screw. Heretofore the screws had been liable to break in two or bend at the point of the sudden diminution of the wire, caused by cutting the thread. By the patent referred to, however, the wire, while uniform from the base of the head to the beginning of the thread, decreases in size with a regular taper for about one-half the length of the thread, and then continues of uniform size to the beginning of the taper near the point. To facilitate foreign trade, about this time the property of the Canada Screw Company, at Dundas, Ontario, was purchased, which enables the company to compete on equal terms with English manufacturers.

### Preservation of Coal.

Some interesting particulars concerning a method for preserving coal from deterioration in store have reached us from Austria, the method, as we are told, having been applied with considerable success by a Herr Wenzel Poesch, of Karbitz. He argues that if coal be placed in an atmosphere of steam, excluding air, no chemical action can set in, even in the presence of pyrites, the oxidation of which is, in other circumstances, promoted by moisture. According to this view, any method by which air could be excluded from coal at the same time that it is kept damp would prevent its alteration or spontaneous combustion. Herr Poesch proposes as the most convenient procedure upon this principle to admit into the heap of coal to be preserved exhaust steam from an engine. For this purpose the site of the heap is prepared by cutting trenches in the ground, crossing at right angles, so as to divide the area equally. Upon these trenches are placed loose boards, or, better still, rough gratings, permitting the passage of steam without allowing the coal to fall through, and the coal is then heaped in the usual way. The exhaust steam is afterward admitted into the trenches and allowed to find its way through the mass. When the coal is stored in the open, Herr Poesch advises to cover it with fine coal or cinders, as with charcoal heaps, to prevent the steam escaping by channels and also to prevent drafts of air. This covering, he remarks, is the more important with coals rich in pyrites, but with some others it may be omitted. In this way, it is claimed, a coal which generally deteriorates rapidly with exposure may be stored for months without suffering alteration. At some of the Austrian mines the process is said to be applied on a large scale and with very satisfactory results. Herr Poesch's method, it will be admitted, is rather remarkable in its way, and, if capable of sustaining the claims made for it, seems to offer a very ready solution of an important problem.

**The Action of Light on the Electric Resistance of Selenium.**—As the result of the investigation upon the behavior of selenium, Messrs. Adams and Day arrived at the conclusion that it conducted electrically. Since this would necessitate the assumption that selenium is not an element, according to accepted theories, Mr. Shelford, Bidwell, urges that caution must be exercised in accepting this. It seems possible, however, that, since the selenium in the cells has always undergone a prolonged cooking in contact with the metal terminals, selenides of these metals may exist in the selenium, forming a kind of network, and thus affording conduction through the mass, which, without the cooking, is non-conducting. It has not been possible to test this directly, but a somewhat analogous case has been tried. Some precipitated silver was heated for some hours with sulphur, and the clear liquid poured off. A cell was then made by cooling two silver wires side by side upon a strip of mica, the spaces between the wires being filled with the prepared sulphur, which would contain a small quantity of sulphide of silver. It was found necessary to reduce the resistance of the cell by placing a small strip of silver leaf over the sulphur and cooking again. The cell thus prepared was very sensitive to light; by burning a piece of magnesium near the resistance was reduced to one-third.

# The Iron Age

AND

## Metallurgical Review.

New York, Thursday, July 9, 1885.

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## New York Imports of Iron and

Steel.

In the absence of prompt and detailed official statistics of the imports of iron and steel into this country, a good idea of the magnitude of our purchases in foreign countries may be obtained from the figures gathered by the Metal Exchange of the quantities which entered the port of New York. From the monthly tables we have compiled the following summary:

	New York.	New York.	Other ports. 1884.
6 months. 1884.	York.	York.	ports. 1884.
Pig iron.....	17,702	70,429	82,467
Spiegeleisen.....	21,555	61,207	71
Iron ore.....	5,900	29,402	432,076
Old rails.....	100	549	
Scrap iron.....	194	7,206	26,917
Scrap steel.....	1,276	6,803	
Steel blooms.....	1,618	4,176	12,306
Steel rails.....	1,842	23,889	7,942
Steel wire rods.....	27,779	89,179	31,446
Iron wire rods.....	803	11,229	
Iron bundles.....	8,975	29,183	
Iron, bundles and bars.....	95	389	21,790
Round bars.....	163	71	
Cotton ties.....	732	3,296	13,751
Sheet iron.....	327	2,417	2,908
Steel, bundles.....	1,680	6,108	5,061
Bars, steel forgings and tires.....	575	2,273	

It will be observed that in every item except that of cotton ties the imports during the first six months of the current year are less than one-half of the total of the year 1884. Apparently pig iron has fallen off one-half. Out of the 17,700 tons imported during the past six months all but 4000 tons, which was special hematite pig for open-hearth purposes, was Scotch pig. Spiegeleisen, it will be observed, has declined heavily. The importation of iron wire rods has practically stopped; that of steel wire rods has materially fallen off. We do not take Swedish iron at the rate we did, and it is likely that the business will shrink even more markedly in the future. One of the largest firms importing Swedish iron is now offering its customers that grade of material bars and rods rolled from imported basic steel blooms at 1 cent a pound less than they are selling the iron for. Consumers will not be long to make up their minds with such inducements. The quantity of iron beams thus far received is small. It is estimated, however, that contracts have been placed in this market for about 1200 to 1400 tons of foreign beams. Under the competition

of American crucible steel the volume of business done in foreign has certainly dropped off materially. The rails enumerated in the table are undoubtedly simply in transit for Canada.

We have in the above table added a column giving the receipts in 1884 at all other ports, with the object of allowing some idea to be formed as to what share comparatively New York has of the import movement. From this, again, some conclusion may be drawn in the case of a number of items on the imports into the country at large. Baltimore and Philadelphia together receive almost all the ore, so that the New York return has only a local significance. About two-thirds of the pig iron and spiegel, one-third of the scrap, one-fourth of the steel blooms, three-fourths of the wire rods, the bulk of the bar steel, all of the Swedish iron and the greater amount of the sheet iron come to this port. So far as bar iron is concerned, the foreign material goes almost exclusively to Boston. It is only, therefore, in those items in which New York can claim a very heavy percentage of the entire business of the country that the figures for the first half of the year given above possess great significance. Their teaching, as a whole, is certainly favorable to our home works.

## The Position of Wire Rods.

For a year past the values of wire rods, as gauged by the quotations forming the basis of sales of foreign material in tide-water markets, have shown a constant decline. How heavy and continuous it has been is illustrated by the following figures:

## Prices of Foreign Steel Wire Rods.

1884.	July.....	\$46.00 @ \$47.00
	August.....	46.00 @ 46.50
	September.....	45.00 @ 46.00
	October.....	45.00 @ 46.00
	November.....	44.00 @ 45.00
	December.....	44.00 @ 45.00
1885.		
	January.....	43.00 @ 45.00
	February.....	42.00 @ 43.00
	March.....	40.00 @ 42.00
	April.....	38.50 @ 40.00
	May.....	38.00 @ 39.00
	June.....	38.50 @ 39.00

During this entire period the market has been dull, and often values were nominal for a month at a time. During the latter part of 1884 the decline was largely due to resales of wire rods by consumers who had contracted for more than the demand for finished product warranted. During the current year the anxiety of some importers to do business caused them to frighten buyers by offers which cut under one another in rapid succession. Though partly responsible for this state of affairs, "spot stocks" were made the pretext of a good deal of this wild competition, and figures were named which go even below the lowest given by us in the above table. A good many causes contributed toward creating the demoralization alluded to. First, the competition of domestic mills, especially at interior points, became more and more severe; then the demand, which, though experiencing its usual temporary spring spurt, did not come up to expectations by any means. The German mills, having a poor home trade, were eager for American business, and importers here found little trouble in beating them down. Freights, too, showed a general tendency downward. Thus, everything conspired to aid a decline, in which the manufactured goods, too, participated. Plain wire has weakened until to day it has reached unprecedented figures, and barb wire is lower now than it ever has been in the history of that industry. It may be stated, too, that those who have followed its development almost from its inception acknowledge that the season of 1885 was the first which failed to show a heavy growth over the one preceding it. Under the circumstances it is not surprising that the wire mills bought wire rods hesitatingly, with slow sales for their product on the one side, and anxious sellers of raw material urging them on the other.

They are now somewhat suddenly asked to pay an advance. A round lot has sold at \$38.75 within the past 10 days, and now \$39.50 is the lowest figure quoted by any of the importers. It is explained that the German mills who were cheap sellers of wire rods have been filled up; that the others decline orders at the figures lately current, and finally that the German mills are about to enter into a combination. There certainly has been a good deal of discussion on the latter point, and while we have no specific advices confirming the acceptance of the agreement proposed by the leading mills, the tone of the German press indicates that it will be carried out. How much this will affect this market remains to be seen. The German pools include coal and pig iron, and the cost of production of the mills will probably be advanced thereby. But the general tenor of all the discussions relating to pools in Germany has been to draw a very sharp line between the prices to be fixed for the domestic markets and for the export trade. To what length German ironmasters are willing to go in the direction of low prices in foreign markets, they have proved in the rail trade. It would not take very much higher prices than those current now to drive every wire-rod mill in this country up to full capacity. They can certainly buy the billets very cheaply from the steel mills, and the result of an advance on the part of importers would be to transfer the business to the home mills, who we believe, are capable of coping with the small current demand. They are steadily encroaching upon the field of the foreign article, and any marked ad-

vance would probably hasten the coming of the inevitable end, which means the transfer of the business to our domestic mills, with the exception of the quantities used for export as finished articles. With the dull season before consumers of wire rods, and with domestic competition active and aggressive, it is difficult to understand how anything but a moderate advance can be secured at present.

## New Processes.

It is announced that Mr. Davy, who has reached this country, has made an arrangement with a number of gentlemen at Sharon, Pa., under which they will control the patent rights in this country of the process which Mr. Davy claims as his invention. Thus far sufficient details of the method and of the results experimentally obtained have not been submitted to admit of any estimate of its value or scope. The first impulse naturally is to look with favor upon new departures, even when the enthusiasm of its advocates is prudently discounted. The statement, somewhat vaguely put, is now going the rounds that steel can be made by the Davy process at a saving of \$6 per ton over ordinary iron. We have not seen the details, and must remain in an attitude of reserve until they are forthcoming. Possibly Mr. Davy is even now beginning to suffer from the enthusiasm of his friends, like the gentlemen who are interested in the Clapp-Griffiths process. The latter have certainly a good deal to complain of. Their work has been seized by sensational writers who have been indiscriminately dismissing the puddler, dismantling the open-hearth furnace, and consigning the ordinary Bessemer converter to a modest position in the rear. While all these great accomplishments have been foreshadowed on paper, the engineers in charge of the plant at Pittsburgh have, we presume, been steadily at work to prove to the skeptics just how many tons a day could be produced in current work, running week after week with a fairly-drilled crew, and exactly what the percentage of waste of iron amounts to. It is an easy thing to be a prophet, but it takes a long time and persistent work to bring about even a small metallurgical revolution.

While on the subject of new processes in the manufacture of iron and steel, it may be well, without any reflection by association upon the work to which allusion has been made, to note the Bull process. That direct method was brought out some time since with a great flourish of trumpets both in England and in this country, the erection of a plant being begun in each instance. Gradually, however, the new claimant faded out of sight, and the English financial newspapers administered the savage post-mortem castigation for which they are famous. The shares, of a par value of £1, dropped to 1/6, and the concern seemed lost beyond resurrection, when two engineers, Messrs. Healey and Thwaite, took hold of the matter, and by modifications and new inventions so far restored confidence that the shares are reported worth 7/-. A grateful assembly of stockholders acquired from them all these improvements for £5000 in fully-paid-up shares. The works at Trimscaran, Wales, are to be completed in a few weeks, and then the metallurgical world is to know definitely what the Bull-Healey-Thwaite hydrogen direct process amounts to. Direct processes have evidently not lost their dangerous fascination. The last who has succumbed to it, and, let us hope, has conquered, is Dr. Eames, who may be remembered in connection with attempts to utilize petroleum as a fuel in iron making. Dr. Eames, we understand, has discovered that graphite has charms as a reducing agent which the other forms of carbon do not possess, protecting the iron from oxidation in some mysterious manner. Thus far only scant data have been published. It will certainly take a remarkably impregnable array of well-authenticated data and figures to shake the firmly-rooted antipathy of the ironmasters of the period against any direct process. Any fancy Bessemer method takes a good deal better.

"Conventions," or pools and combinations as we generally call them, are growing in favor in Germany as a specific for the evils of declining market, and the subject is now being seriously discussed by the iron rolling mills, who will probably follow the example set by the colliery proprietors of the Dortmund district. The latter have entered into an arrangement which we believe is without precedent in the industrial history of any country. The association consists of a membership in which every 1000 tons of coal hoisted per quarter is entitled to one vote. There is a board of managers numbering 12, and a general manager whose powers are very great, his approval being necessary for every sale made individually by any member of the pool. On all transactions closed at figures above the minimum rates of the combination the pool gets one-fifth and the seller four-fifths of the excess, and this is to continue until the sums thus collected have reached the total of 500,000 marks. When a restriction of output is ordered, it is distributed on the basis of the shipments of the preceding quarter, no account, however, being taken of the quantities shipped by one member of the pool to another member, nor of exports by sea or shipments to Italy via the St. Gotthard tun-

nel. A penalty of 6 marks per ton of coke and 4 marks per ton of coal is imposed upon those who produce more than their allotment or who make sales without notifying the general managers, and there is a penalty, besides, of 1000 marks to those who decline to accord to that functionary access to books and correspondence, or who attempt to mislead him by false statements. The costs of administration of this cast-iron pool are to be borne pro rata on the basis of production, one ton of coke counting one ton and a half of coal.

July 9, 1885.

## THE IRON AGE.

17

appoints a committee to wait upon the mayor of the city with the object of inducing him to promise not to order out the police. Yet these same men a day before had by force driven fellow-workmen from occupations in a mill and had shown a disposition to commit acts of violence on the slightest pretext. For a day they marched triumphantly and unchecked from one works to another, scattering the working force of establishments which had nothing to do with the contest except that some of the owners were interested in the mill where the disturbance had started.

Practicing small economies in manufacturing is a matter which in late years has attracted much attention, and it is gratifying to note that the generally satisfactory results obtained have exercised a most beneficial influence. The principal difficulty opposing progress in this line is that of convincing those directly interested that small economies are but component parts of large economies, and that, however insignificant they may appear when considered separately, their combined effects are not to be ignored. This fact, however, has been recognized, and its importance is now appreciated in many places. Thus we find that in some large establishments special men are detailed to look after the interests of certain parts of the plant, doing little, if anything, else, and in this way acquiring a superior degree of skill which enables them to secure a maximum of efficiency from those parts under their direct control. A good example of this is found in lacing belts, the proper adjustment of tension having proved to be a factor of sufficient importance to merit close attention. Not only main driving belts from engines to line shafts, but all other and smaller belts driving lathes, planers, drill presses and other machine tools may in some instances be placed under the care of one man with a most profitable result. And so it is also in a number of other directions, experience gradually pointing out long-existing defects and suggesting remedies which in years past would have been regarded as nothing if not wasteful.

As we report elsewhere, the Thomas Iron Company have, during the week under review, reduced the price of No. 2 X Foundry pig iron to \$16 at tidewater, from the nominal quotation of \$17. Standard brands of No. 2 Foundry have for some time been selling, and have been quoted by us, at \$16.50, while brands not so recognized or classified have been freely offered at the figure now named. As is generally the case with similar steps taken by the managers of the Thomas Iron Company, this action is partly a simple public announcement of what others have been driving at quietly, and partly an anticipation of the drift of values. The markets have been in buyers' favor for months, and there was nothing in the situation to warrant the expectation of an early check to that movement. So far as the Thomas Iron Company are concerned, it is pretty well understood in the trade that, if they charge the ore from their own mines with a moderate royalty, they are still producing their metal at figures considerably below current prices. The position of those who must pay \$3 a ton on cars at mine for ore, and combination rates for coal, is, of course, a far more precarious one. Unless there is a profit to them in \$16 at tidewater as the average return on the three grades, they would do best to blow out.

## WASHINGTON NEWS.

(From Our Special Correspondent.)  
WASHINGTON, D. C., July 8, 1885.

The conservative elements among the Democratic Members of the House of Representatives appear to be quietly at work feeling about for a candidate of their own with which to divide the caucus vote with some prospect of securing a majority on the Speakership. Mr. Randall has not only announced that he will not be a candidate under any circumstances, but he will insist upon it, for very obvious reasons. Notwithstanding the fact that he is stronger in his party to-day than he ever was, his friends know very well that he could not draw any material number from Carlisle simply by way of opposition. In order to overcome the effect of a concentration of the opposition vote against Randall, if he were a candidate himself, it is proposed to take up a Southern man and run him with the hope of dividing that vote. The leaders in the movement appear to be divided as to the proper person upon whom to attempt this diversion from Carlisle. A candidate from Alabama has been suggested, but no one appears in the solid Democratic delegation of that State who would quite fill the bill. Hilary A. Herbert was a member of the Forty-eighth Congress, and, while rather moderate in his views, he still leaned very strongly toward the Morrison side of the tariff. Col. W. H. Forney, who represents the principal industrial counties of the State, is also mentioned. This gentleman entered the House as a Member of the Forty-fourth Congress. While he has not made much noise in speeches, he has been active and zealous in the performance of his duties. Another gentleman prominently mentioned in the same connection is Nathaniel J. Hammond, who entered the House with the Forty-sixth Congress as the Representative of the Atlanta, Ga., district. General Blount, of the Macon district, was the Georgia Representative on the Committee on Ways and Means. He was one of the most pronounced supporters of the Morrison theory of revenue reform. The position of Mr. Hammond is not very distinctively known, but it is said that he is conservative. It is generally conceded that he is the most available of all the Representatives from the extreme Southern States for the purpose in view.

The latest announcement by Representative Morrison, that he will introduce a new tariff bill early after the meeting of Congress, has given the question of the Speakership a decided impetus. Morrison, of course, favors Carlisle, and will support him, relying upon his success as the stepping stone to reappointment at the head of the Committee on Ways and Means. Mr. Morrison, who is still here, is very positive that Mr. Carlisle will be re-elected, and by inference that he will again be chairman of the Committee on Ways and Means. This, therefore, would give him decided advantage in the matter of getting his bill before the committee and receiving consideration in the House. Having tried a horizontal reduction, the Illinois Representative is somewhat at a loss whether to make his next experiment on the basis of specific reductions on certain articles or to cling to his senseless theory of a 20 per cent. reduction right through, regardless of consequences.

## FREE TRADERS ORGANIZING.

A gentleman who is familiar with the operations of the Cobden Club says that meetings have been quietly held among the American importers in New York for the purpose of organization and co-operation with the free-trade associations in the country in an effort to revise the tariff on the revenue basis. With that view they will antagonize any attempt to abolish the internal tax or to reduce it by striking out certain articles.

## THE PRESIDENT ON ECONOMIC QUESTIONS.

The President has decided to let up in the matter of general appointments until fall. This is an invitation to the office-seeking community to vacate the city, and give the Chief Magistrate a chance. This announcement does not mean, however, that the President intends to take matters easy for the rest of the summer solstice. There are important questions which need consideration, and to these the President will turn his attention. The silver question is one which will require immediate attention when Congress meets, as the President made an issue with his party on that subject before he assumed the reins of Government. The President proposes to consider these matters before the fall incursion of applicants for the remaining offices in his gift.

## CUSTOMS DECISIONS.

The following decisions have been rendered in customs cases:

The additional (penal) duty of 20 per cent. ad valorem, under Section 2900, Revised Statutes, does not accrue on an excess of quantity of merchandise reported after the goods have been entered.

Certain catalogues, printed in the French language, describing certain articles of American manufacture, imported for advertising purposes and gratuitous distribution, are held to be entitled to free entry, not being of any commercial value.

Certain iron tie rods, made of wrought iron, which are 68 inches in length,  $1\frac{1}{2}$  inches wide,  $\frac{1}{8}$  inch in thickness, with a screw 6 inches in length and  $\frac{1}{4}$  inch in thickness cut on each end, and accompanied with the necessary nuts and washers, are held to be dutiable at the rate of  $2\frac{1}{2}$  cents per pound, under the provision in T. I., new, 164, for "iron \* \* \* bolts, with or without threads or nuts."

Wolframite ore, or tungsten, a mineral substance almost purely metallic, and valuable for the metal contained therein, is dutiable at the rate of 20 per cent. ad valorem, under T. I., new, 215, for "mineral substances in a crude state."

Emery paper, a manufacture of paper and emery, is held to be dutiable at the rate of 15 per cent. ad valorem, under the provision in T. I., new, 388, for the manufacture of paper, or of which paper is a component material.

## CONDITION OF THE BLAST FURNACES OF THE UNITED STATES, JULY 1, 1885.

(Compiled for The Iron Age.)

Location of Furnaces.	Charcoal.			Anthracite.			Bituminous or Coke.		
	Total number of stacks.	Number reported in blast.	Capacity per week.	Total number of stacks.	Number reported out of blast.	Capacity per week.	Total number of stacks.	Number reported in blast.	Capacity per week.
New England.	15	4	280	11	955	1	0	160	285
New York.	14	3	245	11	874	40	9	2,210	31
New Jersey.						17	2	600	15
Spiegel.						3	2	120	1
Pennsylvania.	32	4	322	28	1,547			75	
Lehigh Valley.						51	24	7,655	27
Schuylkill Valley.						44	14	2,880	30
Upper Susquehanna Valley.						24	9	2,159	15
Lower Susquehanna Valley.						37	20	4,700	17
Pittsburgh.									
Allegheny Valley.								12	8,130
Shenango Valley.								4	0
Youghiogheny Valley.								28	6
Juniata and Conemaugh Valley.								6	4,744
Maryland.	15	2	170	13	925	5	1	700	13
Virginia.	30	8	375	22	1,058			1	4,570
North Carolina.	6	1	112	5	284			12	5,545
West Virginia.	5	0	0	5	280			6	2,520
Ohio—Mahoning Valley.									
Eastern, Central and Northern	2	0	0	2	400				
Hocking Valley.									
Hanging Rock.									
Miscellaneous.									
Kentucky.									
Hanging Rock.									
Western Region and Miscellaneous.	6	1	100	5	475				
Tennessee.	8	0	0	8	875				
Georgia.	9	2	320	7	738				
Alabama.	0	1	200	5	257				
Indiana.	12	6	1,560	6	900				
Illinois.	1	0	0	1	140				
Michigan.	28	9	2,718	19	3,240				
Wisconsin.	11	5	675	6	706				
Minnesota.	1	1							
Missouri.	9	1	350	8	1,538				
Texas.	1								
Utah.	1								
Oregon.	1								
Colorado.	0							1	
Total.	234	50	7,692	180	17,156	222	81	20,444	141
									33,135
									224
									92
									131
									49,840

## SCIENTIFIC AND TECHNICAL.

## Painting Ironwork.

Experiments conducted by the Dutch State Railroads on the behavior of different paints for ironwork have shown that red lead best resists the action of the atmosphere. It was discovered, too, that the coat holds better on iron plates cleaned by pickling than when the plates have been scraped or brushed. The trial sheets were pickled with hydrochloric acid, washed with warm water, dried and oiled while still warm.

## The Mechanical Properties of Zinc.

One of the Silesian sheet-zinc rolling mills has had some tests made to ascertain the mechanical properties of its product. It was found that at a temperature of  $10^{\circ}$  C. it had a tensile strength of 27,026 pounds per square inch in the direction of the rolling, and 35,560 pounds at right angles to that direction, the elongation being 18 and 15 per cent. respectively. It was ascertained that the tensile strength varies but little with different gauges, but that there is a difference of 2 to 3 per cent. in favor of the thinner sheets. At the temperatures  $100^{\circ}$ ,  $155^{\circ}$  and  $175^{\circ}$  C. the elongation was 20, 80 and 20 per cent. respectively in the direction of the rolling, and 40, 100 and 40 per cent. at right angles to that direction. The maximum ductility is therefore reached at about  $155^{\circ}$  C. Samples of sheet zinc having at ordinary temperatures an elongation of 15 to 18 per cent. were heated in a bath of oil until they reached a temperature of  $122^{\circ}$  C. After cooling, their ductility had diminished so that the elongation had dropped to 6 to 8 per cent. Sheet zinc must not, therefore, be exposed to elevated temperatures, because it destroys the effect of rolling, and changes the structure of the metal, which approaches then the mechanical qualities of cast spelter.

## The Geology of Natural Gas.

Mr. I. C. White, a leading geologist, after a visit to the great gas wells struck in Western Pennsylvania and West Virginia, found that every one of them was situated either directly on or near the crown of an anticlinal axis, while wells that had been bored in the synclines on either side furnished little or no gas, but in many cases large quantities of salt water. Further observation showed that the gas wells were confined to a narrow belt, only  $\frac{1}{4}$  mile wide, along the crests of the anticlinal folds. These facts, Mr. White says, in science seemed to connect gas territory unmistakably with the disturbance in the rocks caused by their upheaval into arches, but the crucial test was yet to be made in the actual location of good gas territory on this theory. During the last two years Mr. White has submitted it to all manner of tests, both in locating and condemning gas territory, and the general result has been to confirm the anticlinal theory beyond a reasonable doubt. But while he claims that he can state with confidence that all great gas wells are found on the anticlinal axes, the converse of this is not true, viz., that great gas wells may be found on all anticlinals. In a theory of this kind the limitations become quite as important as, or even more so than, the theory itself, and hence he has given considerable thought to this side of the question, having formulated them into three or four general rules which include, practically, all the limitations known to him up to the present time that should be placed on the statement that large gas wells may be obtained on anticlinal folds, as follows:

(a) The arch in the rocks must be one of considerable magnitude. (b) A coarse or porous sandstone of considerable thickness, all the pores of which are as small as possible. (c) The sandstone must be impervious to water, and the gas must be able to pass through it. (d) The sandstone must be impervious to water, and the gas must be able to pass through it. (e) The sandstone must be impervious to water, and the gas must be able to pass through it. (f) The sandstone must be impervious to water, and the gas must be able to pass through it. (g) The sandstone must be impervious to water, and the gas must be able to pass through it. (h) The sandstone must be impervious to water, and the gas must be able to pass through it. (i) The sandstone must be impervious to water, and the gas must be able to pass through it. (j) The sandstone must be impervious to water, and the gas must be able to pass through it. (k) The sandstone must be impervious to water, and the gas must be able to pass through it. (l) The sandstone must be impervious to water, and the gas must be able to pass through it. (m) The sandstone must be impervious to water, and the gas must be able to pass through it. (n) The sandstone must be impervious to water, and the gas must be able to pass through it. (o) The sandstone must be impervious to water, and the gas must be able to pass through it. (p) The sandstone must be impervious to water, and the gas must be able to pass through it. (q) The sandstone must be impervious to water, and the gas must be able to pass through it. (r) The sandstone must be impervious to water, and the gas must be able to pass through it. (s) The sandstone must be impervious to water, and the gas must be able to pass through it. (t) The sandstone must be impervious to water, and the gas must be able to pass through it. (u) The sandstone must be impervious to water, and the gas must be able to pass through it. (v) The sandstone must be impervious to water, and the gas must be able to pass through it. (w) The sandstone must be impervious to water, and the gas must be able to pass through it. (x) The sandstone must be impervious to water, and the gas must be able to pass through it. (y) The sandstone must be impervious to water, and the gas must be able to pass through it. (z) The sandstone must be impervious to water, and the gas must be able to pass through it.

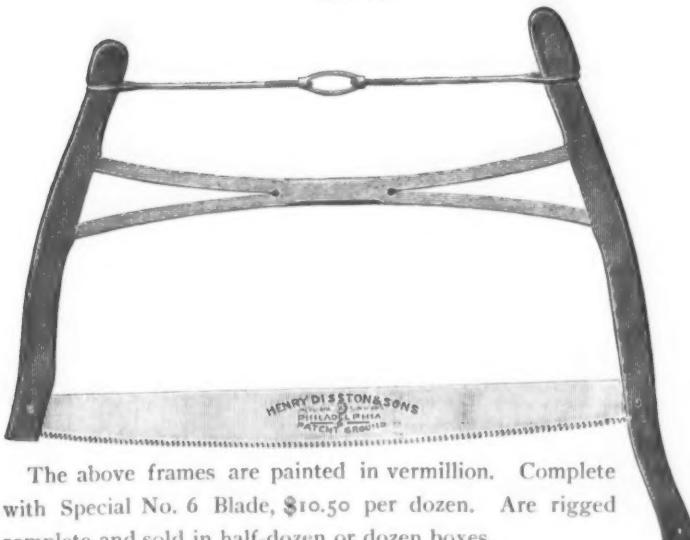
(a) The arch in the rocks must be one of considerable magnitude. (b) A coarse or porous sandstone of considerable thickness,

or, if a fine-grained rock, one that would have extensive fissures, and thus in either case rendered

# HENRY DISSTON & SONS

## Eclectic Wood Saw.

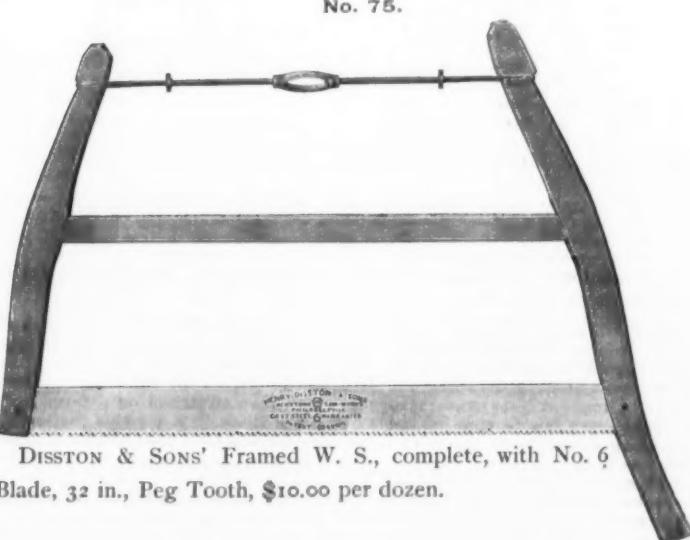
No. 40.



The above frames are painted in vermillion. Complete with Special No. 6 Blade, \$10.50 per dozen. Are rigged complete and sold in half-dozen or dozen boxes.

## Boston Framed Wood Saw.

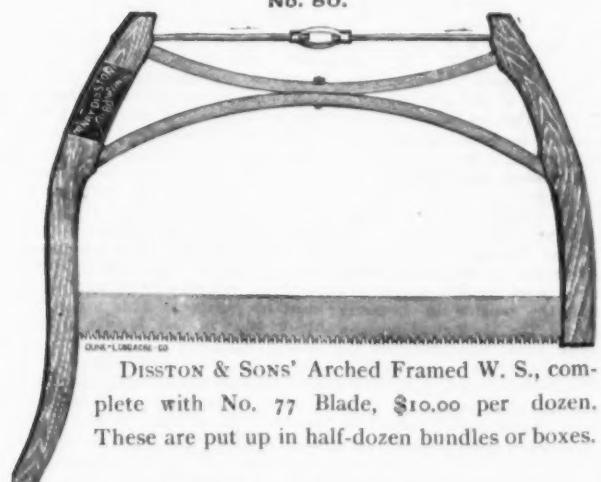
No. 75.



DISSTON & SONS' Framed W. S., complete, with No. 6 Blade, 32 in., Peg Tooth, \$10.00 per dozen.

## Brace Frame.

No. 80.



DISSTON & SONS' Arched Framed W. S., complete with No. 77 Blade, \$10.00 per dozen. These are put up in half-dozen bundles or boxes.

## Disston & Sons'

No. 6.



Disston & Sons' Wood Saws, framed complete with No. 6 Blade, \$9.00 per dozen. The above frame furnished with the swivel loop or plain rod at same price. These are put up in half-dozen bundles or boxes.

IF YOU WANT

A

# SAW

it is best to get one with a name on it which has a reputation.



A MAN WHO  
HAS MADE A  
REPUTATION

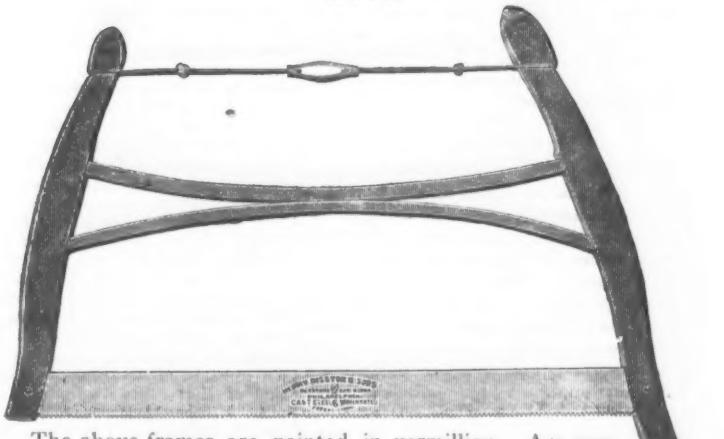
for his goods knows its value, as well as its cost, and

WILL  
MAINTAIN  
IT.

**HENRY DISSTON  
& SONS.**

## Boston Framed Wood Saw.

No. 50.

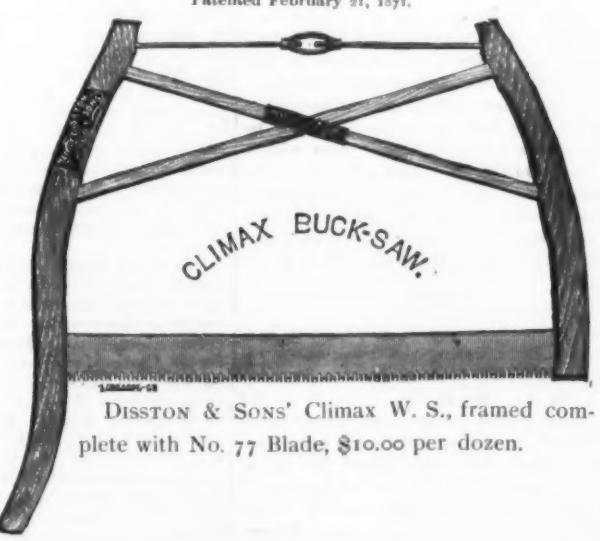


The above frames are painted in vermillion. Are complete with Special No. 6 Blade, 30 in., \$10.50 per dozen; Peg Tooth, No. 6 Blade, 32 in., \$11.50 per dozen. Rigged complete and sold in half-dozen or dozen boxes, as required.

## Climax Frame.

No. 60.

Patented February 21, 1877.



DISSTON & SONS' Climax W. S., framed complete with No. 77 Blade, \$10.00 per dozen.

No. 77.



DISSTON & SONS' Wood Saw, complete with No. 77 Blade, \$9.00 per dozen. The above in half-dozen bundles or boxes.

## Jackson Wood Saws.

No. 4.



JACKSON W. S., complete, \$4.75 per dozen.

## Marshall Wood Saws.

No. 3.



MARSHALL W. S., complete, \$6.00 per dozen. These are put up in half-dozen bundles or boxes.

**KEYSTONE SAW, TOOL, STEEL AND FILE WORKS,  
PHILADELPHIA, PA.**

THE  
Iron Age Directory  
AND  
Index to Advertisements.

PAGE.

Addressed Envelopes and Wrappers. Carr E. W. & Co., Chicago, Ill. .... 44

Agricultural Implements. Rock Island Plow Co., Rock Island, Ill. .... 42

Air Compressors. Norwalk Iron Works, S. Norwalk. .... 46

Air Brakes. Westinghouse Air Brake Co., Pittsburgh. .... 4

Air Money Drawers. Tucker & Dorsey Mfg. Co., Indianapolis. .... 37

Anti-Friction Metals. Reeves Paul S., Philadelphia. .... 48

Arms and Ammunition. E. C. Meacham Arms Co., St. Louis, Mo. .... 32

The Alford Berkely Co., 77 Chambers, N. Y. .... 30

Anvils, Manufacturers of. Eagle Anvil Works, Trenton, N. J. .... 9

Asbestos. Clarkers-Spence Co., 419 Eighth, N. Y. .... 9

Augers and Bits. Bates, Wilson & Co., 80 Chambers, N. Y. .... 14

Bar Iron. Virginia Nail and Iron Works Co., Lynchburg, Va. .... 14

Barb Wire & Fence. Gantler Steel Department of Cambria Iron Co., Johnstown, Pa. .... 3

Hawk Eye Steel Barb Fence Co., Burlington, Vt. .... 3

Iowa Barb Wire Co., 188 Remond, N. Y. .... 2

Washburn & Moen Mfg. Co., Worcester. .... 2

Bellows, Manufacturers of. Bullock T. H., Cleveland, O. .... 14

Belting, Makers of. Alexander B., 412 N. 3d, Philadelphia. .... 30

Atlanta Rubber Co., Atlanta, Ga. .... 3

Man Belting Co., Philadelphia, Pa. .... 26

N. Y. Belting & Packing Co., 13 & 15 Park Row, N. Y. .... 13

Bicycles. Pope Mfg. Co., 597 Washington, Boston. .... 46

Bird Cages, Makers of. Lindeman O. & Co., 254 Pearl, N. Y. .... 3

Maxwell John, 247 and 249 Pearl, N. Y. .... 7

Bit Braces. Amblon & White, Buffalo, N. Y. .... 43

Ives W. A. & Co., New Haven, Conn. .... 47

Millers Falls Co., 74 Chambers, N. Y. .... 20

Bits. Brown R. H. & Co., New Haven, Conn. .... 46

Blades, Knife, &c. Pacific Knife Co., Bridgeport, Conn. .... 36

Blind Awning Fixtures. North F. O. & Co., Boston, Mass. .... 34

Block, Tackle, Makers of. Bagnall & Lord, Boston, Mass. .... 31

McCoy & Sanders, 20 Warren, N. Y. .... 42

McMillan Wm. H., 113 South, N. Y. .... 11

Penfield Block Co., Lockport, N. Y. .... 44

Shubert & Cottrelling, Philadelphia, Pa. .... 30

Boiler Feeders. Automatic Injector Co., Cleveland, O. .... 6

Boilers, Steam. Babcock & Wilcox Co., 30 Cortlandt, N. Y. .... 12

Edge Moc Iron Co., 79 Liberty, N. Y. .... 15

Hartford Boiler Works, Philadelphia. .... 47

Wetherill Robt. & Co., Chester, Pa. .... 47

Boiler Plates. Wm. McIlvain & Sons, Reading, Pa. .... 45

The Seckel & Hastings Co., Wilmington. .... 36

Bolt and Rivet Clippers. Holt & Rivet Co., Philadelphia. .... 36

Bolt Cutters. Gantler Steel Department of Cambria Iron Co., Johnstown, Pa. .... 3

Blocks, Tackle, Makers of. Bagnall & Lord, Boston, Mass. .... 31

Lane Iron, Poughkeepsie, N. Y. .... 42

Scranton Mfg. Co., Chicago, Ill. .... 44

Terry Mfg. Co., Horseheads, N. Y. .... 44

Tucker Mfg. Co., Hagerstown, Md. .... 30

Boiler Plates. Wm. McIlvain & Sons, Reading, Pa. .... 45

The Seckel & Hastings Co., Wilmington. .... 36

Bolts. Brown R. H. & Co., New Haven, Conn. .... 46

Blades, Knife, &c. Pacific Knife Co., Bridgeport, Conn. .... 36

Blind Awning Fixtures. North F. O. & Co., Boston, Mass. .... 34

Block, Tackle, Makers of. Bagnall & Lord, Boston, Mass. .... 31

McCoy & Sanders, 20 Warren, N. Y. .... 42

McMillan Wm. H., 113 South, N. Y. .... 11

Penfield Block Co., Lockport, N. Y. .... 44

Shubert & Cottrelling, Philadelphia, Pa. .... 30

Bolt Cutters. Automatic Injector Co., Cleveland, O. .... 6

Boilers, Steam. Babcock & Wilcox Co., 30 Cortlandt, N. Y. .... 12

Edge Moc Iron Co., 79 Liberty, N. Y. .... 15

Hartford Boiler Works, Philadelphia. .... 47

Wetherill Robt. & Co., Chester, Pa. .... 47

Bolt Plates. Witherow James P., Pittsburgh, Pa. .... 4

Drop Forgings. The Billings & Spencer Co., Hartford. .... 3

Drop Hangers, House and Barn. Iron, Iron Foundry and Machine Co., Cohoes, N. Y. .... 3

Lane Iron, Poughkeepsie, N. Y. .... 42

Scranton Mfg. Co., Chicago, Ill. .... 44

Terry Mfg. Co., Horseheads, N. Y. .... 44

Tucker Mfg. Co., Hagerstown, Md. .... 30

Bolt Plates. Wm. McIlvain & Sons, Reading, Pa. .... 45

The Seckel & Hastings Co., Wilmington. .... 36

Bones, Shell. Jones Jesse & Co., Phila., Pa. .... 26

Brass, Manufacturers of. Ansonia Brass & Copper Co., 19 Cliff, N. Y. .... 5

Bridges, Steel. Bridge Co., 25 Main, N. Y. .... 2

David John & Sons, 100 John, N. Y. .... 47

Holmes, Booth & Haydens, 25 Park Place, N. Y. .... 4

Plume & Atwood Mfg. Co., 18 Murray, N. Y. .... 2

Scoville Mfg. Co., 421 Broadway, N. Y. .... 2

Waterbury Brass Co., 380 B'way, N. Y. .... 2

Brazed Butt Hinges. Tiebow W. & J., 16 & 18 Chambers, N. Y. .... 26

Brass Founders. McFarland Wm., Trenton, N. J. .... 4

Reeves Paul S., Philadelphia. .... 48

Brass Goods. Waterbury Mfg. Co., Waterbury, Conn. .... 2

Breast Plates. Heller & Bros., Newark, N. J. .... 8

Bridge Builders. Murray Iron Bridge & Roof Co., 5 Day, N. Y. .... 4

Union Bridge Co., 16 Broadway, N. Y. .... 38

Bronze, Manufacturers of. Cowles Electric Smelting and Aluminum Co., Cleveland, O. .... 6

Buckets, Pump and Elevator. Iron Cast Mfg. Co., 22 Cliff, N. Y. .... 48

Builders' Hardware. Manhattan Hdw. Co., Reading, Pa. .... 44

Nimick & Brittan Mfg. Co., Pittsburgh. .... 26

Penn Hardware Works, Reading. .... 15

Whipple Mfg. Co., Cleveland, O. .... 10

Butcher and Shoe Knives, Manufacturers of. Wilson John, Sheffield, England. .... 10

Butt and Hinges. Chicago Spring Butt Co., Chicago, Ill. .... 43

Sabin Machine Co., Montpelier, Vt. .... 47

Smith & Edge Mfg. Co., Bridgeport. .... 47

Stainless Works, New Britain, Conn. .... 39

Union Mfg. Co., 98 Chambers, N. Y. .... 7

Car Axles. Roberts A. & Co., 265 S. 4th, Phila. .... 5

Carriage Stretchers. Shaffer & Lord, Laporte, Ind. .... 9

Car Wheels. Knoxville Car Wheel Co., Knoxville, Tenn. .... 40

Union Foundry & Pattern Works, Chicago, Ill. .... 8

Whitney A. & Sons, Philadelphia. .... 5

Carriage Bolts. Norwalk Bolt Works, Norwalk, Conn. .... 12

Townsend, Wilson & Hubbard, Phila. .... 45

Castings, Iron. S. Clark & Sons, Manlius, N. Y. .... 30

Devlin Bros. & Co., Philadelphia, Pa. .... 7

Haight & Clark, Albany, N. Y. .... 47

Hammer & Co., Brford, Conn. .... 16

Haven J. L. & Sons, Cincinnati, O. .... 44

North Bros. & Phil. Co., Philadelphia, Pa. .... 45

Woolfitt, M. & Sons, Woodbridge, Ct. .... 15

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Woolfitt, M. & Sons, Woodbridge, Ct. .... 15

Castings, Iron. S. Clark & Sons, Manlius, N. Y.



## Special Notices.

## Second-hand Machinery For Sale.

One Engine Lathe, 20 ft. bed, 42 in. swing. Bement's make.  
One Engine Lathe, 16 ft. bed, 48 in. swing. Bement's make.  
One Engine Lathe, 27 in. swing, 20 ft. bed. Geared in Face Plate, Screw Feed, Compound Rest.  
One Engine Lathe, 27 in. swing, 20 ft. 6 in. bed. Geared in Face Plate, Screw Feed, Compound Rest.  
One Engine Lathe, 16 ft. bed, 36 in. swing. Bement's make.  
One Engine Lathe, 12 ft. bed, 25 in. swing. Bement's make.  
One Iron Planer, planes 24 ft. long, 62 in. x 62 in. Excellent condition.  
One Iron Planer, planes 12 ft. long, 78 in. x 72 in. Bement's make.  
One Iron Planer, planes 16 ft. long, 42 in. x 42 in. Bement's make.  
One Iron Planer, planes 11 ft. long, 36 in. x 36 in. Bement's make.  
One Iron Planer, planes 8 ft. long, 30 in. x 30 in. Bement's make.  
One Iron Planer, planes 7 ft. long, 30 in. x 30 in. New Haven's make.  
One Iron Planer, planes 6 ft. long, 28 in. x 28 in. Bement's make.  
One foot Radial Drill. Bement's make.  
One 40-inch E. G. S. F. Upright Drill. N. Y. Steam Engine Co.'s make.  
One 12-inch Car-Wheel Borer. Bement's make.  
One 12-inch Slitting Machine.  
One Axle Lathe.  
Two Durrell's 7 Spindle Nut Tappers.  
Send for lists New and Second-hand Tools, too on for publication.

The GEO. PLACE MACHINERY CO.,  
121 Chambers and 103 Reade Streets,  
NEW YORK.

## WHAT ARE YOU LOOKING FOR?

I have on hand a very large stock of New and Second-Hand Machinery, comprising  
ENGINES, Automatic and Slide Valve,  
BOILERS, Vertical and Horizontal,  
STEAM AND BELT PUMPS,  
STEAM ENGINE GOVERNORS,  
MACHINISTS' TOOLS,  
HOISTING ENGINES,  
WOOD-WORKING MACHINERY,  
STURTEVANT BLOWERS.  
Write and state your wants, and will send full particulars.

HENRY I. SNELL, M. E.,  
135 N. 3d Street.  
PHILADELPHIA.

## For Sale.

Located in a good manufacturing town in New York State, a clean and well-selected stock of Hardware, Stoves and Tinware. Tinshop doing a good business, working three men; good business done in the store: stock about \$20,000; reason for selling, poor health. Address for particulars, "D." Office of *The Iron Age*, 83 Reade St., New York.

## 50 PER CENT.

Below cost of production. Stock of Engines and Boilers is too large and must be reduced, therefore the sacrifice. All new and complete at factory, and guaranteed A No. 1 first-class.

8 H. P. Engine, \$136.00. Boiler, \$175.  
10 " 150. " 207.  
12 " 178. " 237.  
15 " 214. " 263.  
20 " 250. " 308.  
25 " 275. " 347.  
30 " 300. " 368.  
35 " 278. " 426.  
40 " 328. " 514.  
50 " 356. " 656.

Send for Catalogue. H. M. SCIPLE,  
107 N. Third St., Philadelphia.

SCRAP IRON  
FOR SALE.

300 " R. R. Spiral Spring Steel.  
200 " Wagon and Buggy Spring Steel.  
200 " Mixed and Flow Steel.  
200 " No. 1 Wrought Iron.  
200 " Sheet and Hollow Iron.  
200 " Threaded Turnings.  
200 " Cast-Iron Boring.  
200 " Grate-Bars and Burnt Iron.

Also a large assortment of New and Second-hand Machinery, Tools, Belting and Metals.

A. LIEBERMAN,  
No. 1443 and 1501 to 1507 State St., Chicago, Ill.

A RARE OPPORTUNITY for a profitable investment in an old established manufacturing business, centrally located in Buffalo, N. Y., completely equipped with first-class machinery, for the manufacture of a full line of Chisels, Draw Knives, Gouges, Axes, Brad Sets, &c., with an A. No. 1 New Engine and Boiler, &c., horse-power complete, at greatly reduced prices, as I wish to retire from active business. For further particulars, apply INDUSTRIAL TOOL WORKS, Mrs. S. M. Parr, Buffalo, N. Y.

## Special Notice.

NEW YORK, May 1, 1885.  
We beg to notify our customers and the trade generally, that, in order to secure greater convenience and efficiency in filling orders for the Beaudry Hammer and our other goods, in New York and Pennsylvania, and adjacent territory, we have established a

BRANCH OFFICE and WAREHOUSE  
AT  
No. 49 Dey Street, NEW YORK CITY,

from which office all our business in that section will be promptly attended to.

BEAUDRY & CUNNINGHAM,  
Manufacturers of the Beaudry Hammer,  
Principal Office, Mason Building, Boston, Mass.

Also, Machine Knives, Hardcoal Heating Forges, Shears, Steam Hammers, Gas Engines, Iron and Steel.

## WANTED.

A partner with \$5000 in an established and profitable commission business in Iron, Lumber and Building Material, in Birmingham, Alabama. Address "IRON," Office of *The Iron Age*, 83 Reade St., New York.

## Trade Report.

## British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, July 8, 1885.

Scotch Pig.—The market is not so steady. We quote makers' brands as follows:

Coltness, alongside, Glasgow..... 48/6  
Langloan, " " " 48/  
Gartsherrie, " " " 47/6  
Summerlee, " " " 47/6  
Carnbroe, " " " 46/6  
Glengarnock, " Ardrossan..... 46/6  
Eglinton, " " " 41/6  
Dalmellington, " " " 41/6  
Shotts, " at Leith..... 48/6  
Lighterage from Ardrossan to Glasgow is 1/8 ton.

Cleveland Pig—is unchanged. We continue quotations, f.o.b. shipping ports:

Middlesboro, No. 1 Foundry..... 36/6  
" No. 2 " " 35/  
" No. 3 " " 32/6  
" No. 4 Forge.....

Bessemer Pig—is unchanged. W. C. Hematites are quoted 43/ for mixed lots, Nos. 1, 2 and 3, equal portions, f.o.b. shipping ports.

Manufactured Iron.—The market is irregular. We quote at works:

Staff, Ord. Marked Bars..... 7 10 0 @ .....  
" Medium " " 6 0 0 @ 6 10 0  
" Common " " 5 10 0 @ 5 15 0  
Hoops, 20 W. G. and over.

" Common Best..... 6 15 0 @ .....  
" Medium " " 6 5 0 @ 6 10 0  
" Common " " 6 0 0 @ 6 7 0  
Sheets, 20 W. G. and under.

" Ordinary Best..... 7 15 0 @ 8 5 0  
" Common..... 7 5 0 @ 7 15 0  
Welsh Bars..... 4 17 6 @ 5 2 0

Steel Rails—Are unchanged. We quote £4. 15/ f.o.b. shipping ports.

Old Rails—Are unchanged. We quote Old D. H.'s, c.i.f. New York, £3 @ £3. 2/6.

Scrap.—The market is unchanged. We quote Heavy Wrought £2. 10/ @ £2. 15/ c.i.f. New York.

Copper.—The market is a little weaker. We quote Best Selected, £48. 10/ @ 49. 10/ and Chili Bars, £44 @ £44. 10/.

Tin.—The market is not so steady. Straits Tin, spot, is quoted £94 @ £94. 10/.

Tin Plates—Are firmer. Manufacturers are considering the proposition to restrict production 25% for six months. We quote:

Tin Plates, 10x14, 1st qual. Charcoal..... 19/6 @ 21/6  
" 2d " " 18/6 @ 19/6  
" 1st " Coke..... 17/0 @ 18/6  
" 2d " " 13/6 @ 14/6

Spelter.—The market is irregular. We quote Ordinary, at shipping ports, £13. 5/ @ £13. 7/6.

Lead.—Since last cable prices have advanced and since have been steadily firm, the market closing strong, with a fair business doing. We quote Common English Pig, £12. 10/.

Freights.—Steam from Glasgow to New York, £1 @ 2/.

## Financial.

Office of *The Iron Age*, WEDNESDAY, July 8, 1885.

The week of the great national holiday has been signalized by few events out of the ordinary course. In an industrial point of view the forcible stoppage by strikers of iron and nail mills in Cleveland and of street cars in Chicago is the most noticeable, but the ultimate effect of the movement is yet the subject of conjecture. As remarked by Mr. Chisholm, one of the largest proprietors, the rolling mill in any event would have stopped later in the year. The Pittsburgh glass manufacturers have also stopped, as is their wont about July 1. Financially, the poor account of railway earnings for the last few weeks was disappointing, and in some quarters had a depressing effect, but it is intimated that the fact has been exaggerated in importance, there being no reason why railways should be exempt from those vicissitudes of fortune which of late are common to all forms of enterprise. Moreover, aside from general business stagnation, railways inevitably suffer from unremunerative rates. It is now announced that an advance in rates has been adopted by all the roads running east from Chicago; as follows: "Resolved, That we will not make to New York, commencing July 1, 1885, a less rate than 15¢ per 100 lb on thirteenth class, and 20¢ per 100 lb on twelfth class, and nothing less on other classes than the rates of the tariff of April 6, and the amended tariff of April 21, excepting the rates on dressed beef, dressed sheep and dressed hogs. The usual differences to Boston, Philadelphia, Baltimore and other points to be as printed in tariff of April 6." A telegram from Chicago says the slight advance to a 15¢ basis, as above noticed, had the effect of largely increasing lake shipments; that otherwise there is little change. On Thursday, however, the lake rate for grain from Chicago to Buffalo was advanced to 2¢ per bushel, or 5 1/2¢ to New York by lake and canal.

Money is a trifle more active, due to a temporary disturbance from the payment of semi-annual interest and dividends, and it is noticed that the flow of currency toward London has again been on the downward track. On July 2 Chili Bars came £44. 10/; the next day, £44. 7/6; July 6, £44. 5/;

West, as the new wool clip is arriving freely at interior markets and the harvest of winter wheat has begun. We quote 60 to 90 days' indorsed bills receivable, 3 @ 3 1/2%. In London the supply of money is increased by the amount of \$35,000,000, released by dividends on English funds. Exchange is firm; an advance in the sight rate on Tuesday was caused by a somewhat urgent demand. The total exchanges of 27 leading clearing houses last week show a decrease of 7 1/2% compared with the same week last year; outside of New York, an increase of 3%. The aggregate exchanges for the month of June, 1885, were \$2,979,987,449, against \$3,181,341,519 in 1884—a decrease of 13%. Outside of New York, decrease 3%. From January 1 to June 30, decrease 27 1/2%; outside of New York, decrease 10%.

Tin.—The market has been moderately active, London coming £93. 15/ with Spot Tin, and three months, £90. Straits meanwhile being worth 21 1/4¢ @ 21 1/2¢, large lines, here, for spot, and 20¢ @ 20 1/2¢ for futures. Mr. Charles Nordhaus, East India agent, 13 Cedar street, New York, furnishes us the items below:

American Statistics of Tin.

June 1, stock in the United States..... 1,800  
June 1 to 30, in ports..... 600

Total..... 2,400

June 1, consumption..... 600  
July 1, stock in United States, estimated..... 1,800  
Afloat from all ports..... 450  
July 1, visible supply..... 2,250

Movement of Tin in June.

Shipments. May June June June  
1885 1885 1884 1883  
Tons. Tons. Tons. Tons.

Straits to Great Britain..... 975 1,350 500 300  
Straits to America..... 150 50 150 900

Total Straits..... 1,125 1,400 650 1,300

Australia to Gt. Britain..... 575 530 600 550  
Australia to America..... 100 ..... 500

Total Australia..... 675 530 600 550

Total shipments..... 1,800 1,930 1,250 2,150

Deliveries from London..... 1,575 1,070 2,130 1,723  
Deliveries from Holland..... 633 830 463 707

Total deliveries..... 2,208 1,900 2,633 2,430

Of which shipped to America..... 202 150 580 170

We are cabled from London this afternoon that the market is not so steady. Tin Plates.

—There has been an improvement. From Wales the report is confirmed that a combination has been formed among the makers, leading to an agreement to remain idle one week per month. It is believed that this may cause a decrease in the supplies. We quote at the close, ordinary brands, 10¢ box: Charcoal Bright, \$4.87 1/2 @ \$5; do. Terne, \$4.50 @ \$4.62 1/2; Coke Tin, \$4.45 @ \$4.50, and do. Terne, \$4.12 1/2 @ \$4.25. Liverpool cables Coke, 14¢, and Charcoal, 15¢ @ 18¢. From London we are told that the market is in the same condition.

Lead.—Without developing much activity there has been a hardening tendency, and some 500 tons Common Domestic sold, of which 400 at \$3.95 and 100 at 4¢, the market winding up firm at 4¢ for Common, and strong at 4¢ for Refined. St. Louis quotes 3 1/2¢ @ 3 1/2¢. In London Soft Spanish gave way from £10. 17/6 to £10. 10. Manufacturers are quoted as follows: Lead Pipe, 5 1/2¢ per lb; Sheet Lead, 6 1/2¢; Tin-Lined Lead Pipe, 15¢, and Block-Tin Pipe, 40¢, allowing in trade for Old Lead delivered in New York, 3¢ per lb. Shot, Drop, 6¢; Buck, 7¢; Chilled, 7¢. Shot in 5-lb bags, 1¢ per lb extra. Our cablegram from London states that the market has advanced, and is firm. Common English Pig, £12. 10/.

Spelter and Zinc.—Nothing of special interest has transpired in Common Domestic Spelter, which has remained moderately inquired after at \$4.15 @ \$4.40, as to brand, while Silesian is nominally worth 4 1/2¢. The latter improved in London from £13. 5/ to £13. 10/. We quote Bertha Refined, as heretofore, 7 1/2¢ @ 8¢, and Sheet Zinc has improved to \$5 @ \$5.20 for Domestic. From London we are cabled that the market is irregular. Ordinary, at shipping ports, £13. 5/ @ £13. 7/6.

Antimony.—In London Hallett has dropped from £38 to £37. Here we have been quiet at 9¢ for the latter, and Cookson at 9 1/2¢.

—

Foreign Markets.

FRANCE.

PARIS, June 24, 1885.—Metals.—A better feeling

has been noticeable in business circles, due, on the one hand, to the fair crop prospects in France, on the other, to the peaceful political outlook, and finally to a better export demand for French manufacturers of all sorts. Metals have been in steady, moderate demand at an improvement in Tin and Lead, and a decline in Copper and Spelter. We quote at the close: Copper, Chilli Bars, 14¢ @ 16.25; Ingots and Slabs, 13.75; Best Selected, 12.25; and Ingots Corocoro Ore, 11.75. Tin, Banca, 24.15; Biscay, 22.50; Zinc, 15.50; Lead, 14.25; and Zinc, 13.75. Iron.—In this city the course of prices has continued steadily downward. Merchant selling at 14 @ 14.50, and Flooring at 13.50. Sheets for roofing sold at 10 @ 10.50. Old Rails at 8 @ 8.50 francs, all per 100 kg. The movement at the North to reduce the price of the finished iron is meeting with general approbation, and can hardly fail to bring about a healthy state of affairs for the flat trade. Merchant iron industry and railroads continue to suffer from lack of orders for rail-road material; the navy orders are also light, and so are those for public works. The only demand keeping up tolerably well is for Merchant Iron; the latter, No. 2, is quoted 14 @ 14.50. Thin Sheets are in active request. The Haute-Marne quotes a quiet market at 14.50 @ 15 francs, No. 1 Merchant: 16 @ 16.50; Mixed: 25.50 @ 26 francs, Wires, Nails, and Chains. Nos. 22-23, 14 @ 15. Coul, 12 and 14. Lead, 24.75 @ 25.25; Spelter, 13.50 @ 14.50. Thin Sheets No. 1, 13.50 @ 14.50. In the Grand Duchy of Luxembourg, White Pig is up at 4.30 @ 4.40 francs, thanks to the syndicate, and Founlay Pig is irregular and shaded on private terms. The Government has declined the bids for Old Rails at the late opening of July 1 next. As matters stand, with a gradual return of export orders for Netherland India and China, attracted by the low prices ruling among us, and the domestic demand maintaining a moderate degree of activity, we are from all appearances likely to bridge over successfully the dull summer months of July and August. In September we shall know all about the result of Continental

cereal crops, and on their more or less abundance and cheapness the development of our Iron trade for the fall months will chiefly

# Trade Report

## New York Iron Market.

**American Pig.**—The announcement by the Thomas Iron Company during the week under review of a reduction of \$1 10¢ per ton to \$16 on No. 2 Foundry is the result of the pressure which has existed for some time past to sell that grade. Relatively it has been in the most plentiful supply with nearly all the companies, and \$17 had long ceased to be anything but a nominal quotation for it. We do not learn that any notable increase in business has followed this move nor was it expected. No. 1 Foundry is nominally held by the leading companies at \$18, but moderate lots can be placed with others at \$17.50. In the absence of transactions on a large scale, lower quotations occasionally made in some quarters are misleading. During the week a large contract was closed in this city for the delivery at Pittsburgh of 5000 tons of Cast-Iron Pipe for a natural-gas line at \$24 for 36-inch, \$25 for 16-inch, \$26 for 10-inch and \$26.25 for 8-inch Pipe. Cincinnati and Newport works underbid the Eastern mills and secured the contract. We quote standard brands of Lehigh and North River Irons, tidewater delivery, as follows: No. 1 X Foundry, \$17.50 @ \$18.50; No. 2 X Foundry, \$16 @ \$16.50; Gray Forge, \$15.25 @ \$16; the outside figure is asked for special brands. Outside brands sell for 50¢ @ \$1 less than our quotations. We note a small sale of Cold-Blast Charcoal Iron at \$24.50.

**Scotch Pig.**—Low offers are made to consumers who are known to have just purchased, with the object of embarrassing the successful sellers. Such reports should therefore be received with reserve. Nominal quotations for 5 and 10 ton lots are as follows: Coltness, \$20 to arrive; Gartsherrie, \$20 to arrive; Shotts, \$20 @ \$20.50 to arrive, \$21 from yard; Carnbroe and Glengarnock, \$19 to arrive; Summerlee, \$19.50 @ \$20 to arrive; Dalmellington, \$18.50 to arrive; Eglinton, \$18 to arrive; Clyde, \$19 to arrive. Concessions are made for larger lots and for sales from dock.

**Bessemer Pig and Spiegeleisen.**—With the exception of one sale of 2000 tons of Spiegeleisen at \$25.50 and \$25.75 ex-ship there is nothing to report. We quote: Foreign Spiegeleisen, 20% remains nominally \$25.50, 10% \$21.50 @ \$21.75, 45% \$42, 60% \$52.50, and 80% \$70.50. Foreign Bessemer is nominally \$19 @ \$19.25. American Bessemer Pig is dull and weak. We quote nominally \$15, \$16 and \$17 for Nos. 1, 2 and 3, respectively, at furnace.

**Bar Iron.**—The market is exceedingly dull, and is particularly weak on Refined. We quote for delivery here in round lots: Common Iron, 1.45¢ @ 1.55¢; Medium, 1.55¢ @ 1.65¢, and Refined Iron, 1.7¢ @ 1.9¢, the lower figures being occasionally shaded. Store prices are 1.6¢ @ 1.75¢ for Common, 1.75¢ @ 1.8¢ for Medium and 1.85¢ @ 2¢ for Refined. Swedish Iron is quoted \$70 a ton, and Imported Nail Rods at \$77.50 @ \$81, ex-ship, according to quality, in large lines. Steel Bars rolled from imported German Basic Steel are being offered to consumers of Swedish Iron at fully 1¢ per lb below prices asked for the imported article.

**Structural and Shaped Iron.**—No orders of any magnitude have been placed during the week. Angles may be quoted nominally 1.9¢ @ 2.1¢, delivered, for round lots, and Tees at 2.1¢ @ 2.25¢. Store quotations remain 2.2¢ @ 2.4¢ for Angles, and 2.5¢ for Tees. American Beams and Channels are 3¢ from dock for all orders. Foreign Beams, in round lots, are quoted 2.5¢ @ 2.6¢ for Belgian, and 2.6¢ @ 2.8¢ for German.

**Plates.**—The material for the Derrick to be built by the Pusey & Jones Company at Wilmington, including Steel Plates, Angles, Bars, &c., has been placed at a low figure. We hear also of other sales of Steel Plates. Usual prices for small lots of Iron Plates are as follows: Common or Tank, 2 @ 2.1¢; Refined, 2.4¢ @ 2.5¢; Shell, 2.4¢ @ 2.5¢; Flange, 3.4¢ @ 3.5¢; Extra Flange, 4¢ @ 4.5¢, with concessions for large lines. For small lots of Steel Plates the quotations are as follows: Ship, 3¢ on dock; Tank, 2.5¢ @ 2.6¢ for Flange, and 4¢ @ 5¢ for Extra Flange and Fire-Box.

**Merchant Steel.**—Quotations for the range from ordinary to good grades are as follows: American Tool Steel, 7.5¢ @ 10¢; Tool Steel of special grades and finer qualities, 12¢ @ 20¢; Crucible Machinery, 4.5¢ @ 6¢; Spring and Tire, 2.5¢ @ 2.5¢; Open-Hearth Machinery, 2.5¢ @ 2.5¢, and Bessemer Machinery, 2.5¢ @ 2.5¢; English Tool, 13.5¢ @ 15.5¢.

**Steel Rails.**—Business has been very dull. There are a number of inquiries in the market, among them one for 17,000 tons and another for 20,000 tons, fall and winter delivery. There has been again some quiet discussion of the question of arriving at some agreement among the mills, though the general impression in the trade is that there is little more chance for a combination now than there has been in the past. We quote nominally \$27 at mill.

**Steel Wire Rods.**—There have been some transactions at private terms. Sellers

generally insist upon higher figures, and \$39.50 is the lowest quotation made. We quote nominally \$39.50 @ \$40.50. We discuss the situation editorially.

**Old Rails.**—With the exception of a few small sales, nothing has been done. We quote \$16.25 @ \$16.75, sales having taken place at the higher and at the lower figure.

**Scrap.**—The market is very dull and nominal at \$18 @ \$18.50 for No. 1.

**Old Wheels.**—The market is irregular. They are offered as low as \$15, but lots are inferior and delivery inconvenient. We quote \$15.25 @ \$15.50.

**Rail Fastenings.**—Quotations for large lots are 2.55¢ @ 2.65¢ for Bolts and Square Nuts; 2.75¢ @ 3¢ for Bolts and Hexagon Nuts, and 1.55¢ @ 1.7¢ for Splice Bars. Railroad Spikes are quoted 1.85¢ @ 1.9¢.

**Messrs. Charles G. Eckstein & Co.** of 302 Liberty street, this city, are about to introduce into the market Heptagon Rock Drill Steel, manufactured by J. C. Soeding & Halbach, of Hagen, i. W., Germany. It is claimed that Heptagon Steel makes drilling easier.

### Metal Exchange.

The following transactions are reported:

THURSDAY, July 2.	
5 tons Tin, July.....	.30.205
FRIDAY, July 3.	
5 tons Tin, spot.....	.31
5 tons Tin, July.....	.30.205
MONDAY, July 6.	
10 tons Tin, July.....	.30.7
10 tons Tin, July.....	.30.8
TUESDAY, July 7.	
5 tons Tin, July.....	.31

### Philadelphia.

Office of *The Iron Age*, 290 South Fourth St., PHILADELPHIA, July 7, 1885.

**Pig Iron.**—There has been very little business done since date of our last report, so that the position is much the same as it was a week ago. There has been rather more inquiry, perhaps, but actual sales have not been of much importance. Consumers find their requirements somewhat restricted, so that there is not much inducement for them to extend their purchases at the moment. Really good brands are firm, as the supply is barely sufficient, especially of No. 1 Foundry. In the aggregate the supply of Pig Iron is considerably in excess of the demand, but the general quality is not nearly up to standard; hence the contradictory position of the market, one class of Iron being scarce and firm, others dull and weak and in some cases almost unsaleable. There is nothing at present likely to change this feature of the market, so that buyers take none but small lots as required from time to time. In this way \$18 @ \$18.50 is realized for standard and choice brands of No. 1 Foundry. \$16.50 @ \$17 for No. 2, and \$15.50 @ \$16 for Gray Forge. There are other Irons at \$17 @ \$17.50 for No. 1, \$16 for No. 2 and \$14.50 @ \$15 for Gray Forge, the difference in price being due to quantity, quality and similar considerations. On the whole, the tendency of the market seems to be slightly in buyers' favor, but, as already stated, a good deal depends on circumstances governing the transaction at time of sale.

**Foreign Iron.**—There is no demand for anything except small lots of Bessemer, with sales of special brands in small lots at from \$19.25 upward. Large buyers are not in the market, so that prices are entirely nominal at \$18.50 asked for Bessemer, and \$25 for 20% Spiegel.

**Muck Bars.**—There is no change in quotations, and at the moment very little demand, although one or two sales have been made at extremely low figures, with \$26 asked for medium quality, and \$27 @ \$27.50, delivered, for the best.

**Blooms.**—Prices entirely nominal, as no sales have been heard of for some days past. We quote as follows: Soft Basic Blooms, \$33.50 @ \$35; Billets, \$38 @ \$39, and Siemens-Martin, \$40 @ \$42; extra quality, \$43 @ \$45; Domestic Blooms, \$30.50 @ \$32, delivered, for Nail Plate, and \$35 @ \$36 for Plate and Sheet Blooms. Other descriptions dull and prices nominal, as follows: Charcoal Blooms at \$50 @ \$52; Run-out Anthracite, \$43 @ \$44; Scrap Blooms, \$34 @ \$35; Northern Ore Blooms, \$34.

**Manufactured Iron.**—There has been a fair demand considering the holiday character of the season, and in some quarters there is a disposition to take a more hopeful view of the position than has been done of late. Orders have been rather more numerous, and a considerable number of inquiries are coming in from various classes of consumers. No large lots have been taken or inquired for, but, one way or other, a very fair amount of business has been done in the aggregate. Bridge work to the extent of about 2500 tons has been taken. Tank and Boiler Iron has also sold moderately. Bar Iron has not shown much activity, but some of the mills are busy on Skelp Iron, so that, on the whole, prospects are fairly encouraging. Prices show no improvement, however, recent transactions having been on the basis of about 2¢, delivered, for Plates and Angles; 1.8¢ for Skelp, and 1.65¢ @ 1.75¢ for Bar Iron, with Common Bars at 1.4¢ @ 1.55¢.

**Steel Rails.**—Business has been very dull. There are a number of inquiries in the market, among them one for 17,000 tons and another for 20,000 tons, fall and winter delivery. There has been again some quiet discussion of the question of arriving at some agreement among the mills, though the general impression in the trade is that there is little more chance for a combination now than there has been in the past. We quote nominally \$27 at mill.

**Steel Wire Rods.**—There have been some transactions at private terms. Sellers

placed an order for 20,000 tons. Several lots of 2000 to 5000 tons each are likely to be placed soon, but it is difficult to arrive at the exact figures offered. There are free sellers at \$27 at mill, but how much less will be accepted can only be known to those making an offer. Small lots are taken at about \$27.50, and the outlook indicates a fair demand for the next two or three months, if not beyond that.

**Old Rails.**—Somewhat more interest is manifested in this department, but it is difficult to hold prices much above \$17. One choice lot of 500 tons was taken at \$17.50; another of 700 tons at \$17.25, with buyers at \$17 @ \$17.25 for additional lots—all Philadelphia deliveries. At interior points \$18 @ \$18.50 is asked, but the demand is somewhat languid, buyers' ideas of value being about 50¢ below the asking prices.

**Scrap Iron.**—There is a fair demand, and quotations given below are for Philadelphia deliveries—interior deliveries would bring about 50¢ per ton more—as follows: No. 1 Wrought Scrap, \$17 @ \$17.50; No. 2 do., \$12 @ \$13; Horse Shoes, \$22 @ \$23; Turnings, \$13 @ \$14; Old Car Wheels, \$15 @ \$16; Old Steel Rails, \$16 @ \$16.50; Fish Plates, \$22 @ \$23; Cast Scrap, \$13 @ \$14; do. Turnings, \$9 @ \$10.

**Wrought-Iron Pipe.**—While there has

not been much new business reported recently, the mills appear to be reasonably well employed; some of them are running full. Prices remain unchanged, and, so far as we can learn, there is little or no cutting. Discounts quoted as follows: Black Butt-Welded Pipe, 1 1/4-inch and smaller sizes, 45 @ 50%; on Galvanized do., 35 @ 40%; on Black Lap-Welded, 1 1/2-inch and larger sizes, 65 @ 65 and 5%; on Galvanized do., 45 @ 50%. For Selected Pipe, or Pipe cut to specified lengths, the discount is 5% less than rates above quoted. Discount on Boiler Tubes, 60%. Two-inch Oil-well Tubing, 10¢ @ 11¢; 5 1/2-inch Oil-well Casing, 36¢ @ 37¢.

**Old Rails.**—We can report a sale of Old Iron Rails at \$18.50, and it is said that there are additional offers being made to sell at the same price; consumers expect to be able to buy at the even money—\$18—before long. Old Steel Rails are quotable at \$10 @ \$17, according to lengths, and dull.

**Steel Rails.**—For near-by delivery Heavy Sections are still quoted at \$28, cash, deliverable on cars at works, for fall or winter delivery. Desirable orders might be taken from 50¢ to \$1 below prices quoted. The story which originated in one of the daily papers here, in regard to a certain Western railroad having contracted with the Edgar Thomson Works for 15,000 tons, has no foundation; the Edgar Thomson Works have a contract with the railroad in question, but it was made a good while ago.

**Railway Track Supplies.**—There is very little inquiry for anything in this line, and not likely to be for some time to come. Prices are still quoted as before, but for a desirable order might be shaded. Spikes, 1.9¢, 30 days delivered; Splice Bars, 1.6¢ @ 1.7¢; Track Bolts, 2.75¢ @ 2.85¢, the former with Square and latter with Hexagon Nuts.

**Steel.**—No important change to note in the Merchant Steel trade; business continues slow and prices unsatisfactory. Refined Cast Steel, 8 1/2¢; Crucible Machinery, 4 1/2¢ @ 4 1/4¢; Open-Hearth and Bessemer do., 2 1/2¢ @ 2 1/4¢. Steel Nail Slabs still quoted at \$29 @ \$30, with some inquiry, notwithstanding the Nail strike.

### Chicago.

Office of *The Iron Age*, 36 and 38 Clark St., COR. Lake St., CHICAGO, July 6, 1885.

Business was very quiet last week in most branches, the dullness being increased by the occurrence of the national holiday. Merchants made no purchases beyond their immediate requirements, and devoted most of their time to the taking account of stocks on the last and first days of the month. July is always a quiet month, and no particular improvement is likely to take place until August, as trade never starts up until after the harvest is gathered. Traveling salesmen are sending in less encouraging accounts of their experience with country customers, but the outlook for the autumn trade appears excellent at the present time.

**Iron Ore.**—The local situation remains unchanged; the few furnaces in blast here are buying along as their necessities require, while those out of blast are refusing to anticipate future wants. Advices from Cleveland report that the shipments of Lake Ore fall about 500,000 tons short from January to July 1, as compared with the same time in 1884. Escanaba shows the largest falling off in shipments, only 397,471 tons having been forwarded up to July 1, while for the same time last year the amount was twice as much. The Lake Superior Mine, at Ishpeming, leads all the others at that point, having shipped to date 78,044 tons. The output of the mines this year will fall short of that of a year ago. Lake freights from Marquette to Cleveland and other Lake Erie ports have been offered as low as 9¢, and even 85¢, per ton, the lowest ever reached.

**American Pig Iron.**—The apathy which has characterized the market during the week was not entirely unexpected, but, nevertheless, very unwelcome. Trade has been in such decidedly less volume that agents were almost entirely idle, and sought refuge in fishing excursions and other holiday recreations. Carload buying has fallen off more than during any previous week for several months, and only one or two contracts of 500-ton lots have been made. This dullness, following upon the depressing feature of the two weeks previous, had a marked influence upon prices, and the general tendency was toward lower figures on the whole line, as seen from the consumers' side. Sales agents are not inclined to make lower prices, and furnaces report that they cannot see any advantage to be derived from such a course. They complain that prices now are not paying, and that to make still further reductions means disaster staring them in the face. There is no doubt, however, but what the market at the moment is in the buyer's favor. All talk on prices of iron is based upon the possibility of reducing the cost through improved processes in the manufacture, or curtailment of expenses. Furnaces, in looking over their works, preparatory to making iron for fall consumption, state that they cannot see any changes that will further reduce their cost, and are at a loss to understand the causes which lead consumers to the conclusion that there is no limit to the reductions which manufacturers can make. In accordance with the few sales that have been made and the weakness that has been displayed in the market, we change our quotations on carload lots, four months, as follows: Lake Superior Charcoal, Nos. 1 and 3, \$19 @ \$19.50; Nos. 4, 5 and 6, \$20 @ \$21; Lake Superior Coke, All Ore, \$18 @ \$18.50; Cinder Mixed, \$17 @ \$17.50; Ohio Bessemer Iron, \$17.50 @ \$18.00; South

were on hand weakened prices about 10¢ per ton, which makes present quotations on Two-Point and Four Point Painted Cattle Wire, \$3.50, and on Two-Point and Four-Point Hog Wire \$3.60, with the usual advance for Galvanized. Very few of the Barb-Wire makers are running on full time now, and the majority of them are contemplating closing down for the greater portion of July. There seems to be two reasons for this course—one, that prices are weak, and, with the cessation, the balance of stock that remains in the hands of manufacturers and jobbers will be entirely absorbed; the second, that there is a strong desire on the part of manufacturers to have the unlicensed Wire question thoroughly settled, so that they may be safe in making a price which they can sustain before making up new stocks of Wire.

**Nails.**—The demand for Nails during the week was not so great as heretofore. Prices in this market are very well sustained at \$2.30 per keg for Iron and \$2.40 for Steel Nails in small lots. Stocks are being consumed very evenly, and through the exchange of sizes of Iron Nails among jobbers, and the buying and selling from each other of those which they have not, they manage to supply all the demand that has thus far been made upon them. Steel Nails are also reported short, but there are full stocks of sizes in the hands of some of the jobbers. The 8d, 10d and 12d in both classes are the most called for and the hardest to get. While the Nail mills continue to be idle, there is considerable talk among manufacturers about starting up their mills. No one has any definite idea upon the subject, but the continued attempts of Eastern manufacturers to sell Nails in this market is becoming an annoying feature. It is said that Eastern Nails have been offered here as low as \$2.05 in carload lots, but we cannot learn that any sales have been made at these or other figures. The entire Western trade has an aversion to patronizing manufacturers who are endeavoring to take advantage of the situation, and, so long as stocks can be controlled to meet the requirements, it is not likely that they will meet with much encouragement. It is said that the Bay View Mill has quite a good stock on hand, and one or two other makers in the West have also fair assortments which they are offering in small lots to jobbers at current rates. In the present conditions of trade the 10¢ difference between Iron and Steel Nails has about equalized the demand, and jobbers and makers have arrived at the conclusion that a scale adopted with this difference would make the consumption of the two brands of Nails regular and consume the Steel Nails as fast as they can be produced by the number of manufacturers that are now engaged in making them.

**Iron Ore.**—Reports from Ishpeming, Mich., under date of July 4, make the aggregate of lake shipments of Ore for this year, ending the 1st inst., from Marquette, L'Anse, Escanaba and St. Ignace, 619,416 tons. This is nearly 500,000 tons short of the amount shipped in the corresponding period in 1884. Escanaba shows the largest falling off in shipments, only 397,471 tons having been forwarded up to July 1, while for the same time last year the amount was twice as much. The Lake Superior Mine, at Ishpeming, leads all the others at that point, having shipped to date 78,044 tons. The output of the mines this year will fall short of that of a year ago. Lake freights from Marquette to Cleveland and other Lake Erie ports have been offered as low as 9¢, and even 85¢, per ton, the lowest ever reached.

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# Trade Report.

## General Hardware.

As usual at this season there is a lull in general trade. More inquiries are, however, reported, and some goods are being sold. But few changes are being made in the prices of goods, and there are indications that manufacturers in several lines are disposed to hold their prices more firmly. The hope is expressed by the trade that recent advances in some leading lines may be maintained.

### NAILS.

The market has been steady. The demand continues moderate, but for the time being the supply is not crowded on the market as urgently as in the past. So far as the future is concerned, a good deal depends upon the developments in the West. At the present writing indications point to an early resumption of work at the mills. We quote Iron Nails in round lots, on dock, \$2, the store quotation remaining nominally \$2.10 @ \$2.15 for Iron Nails and \$2.25 @ 2.35 for Steel Nails. The condition of the trade in other leading markets is reported elsewhere.

### BARE WIRE.

The volume of business, as is natural during this season of the year, is small. Quotations remain unchanged at 4.35 to 4.45 cents for carload lots of Four Point Galvanized Barb Wire; 4 1/2 to 4 1/4 cents for small lots. The export trade has been light at the usual concession due to drawbacks on imported raw material.

### CORDAGE.

The following is the new list of Manila, Sisal Rope, &c., which bears date July 1st, and is subject, it will be understood, to the usual discount to the trade of 1 cent per pound:

Manila Rope.	Cts per lb.
1 1/4 inch cir. and upward.....	18 1/2
12 thread, or 3/8 inch diameter.....	14
12 and 13 thread, 1 1/4 and 5-16 inch diameter.....	14 1/2
Barb Wire, 2, 3, 4 or 5 thread.....	13 1/2
Bolt and Point Rope.....	18
Tarred Rope and Lath Yarn.....	18
Stave, Leather and Hop Twine.....	14
Sisal Rope.....	8 1/2
1 1/4 inch cir. and upward.....	8 1/2
12 thread, or 3/8 inch diameter.....	9 1/2
6 and 9 thread, or 1/4 and 5-16 inch diameter.....	9 1/2
Barb Wire, 2, 3, 4 or 5 thread.....	8 1/2
Tarred Rope and Lath Yarn.....	8
Russia Hemp.....	17
White Rope.....	11
Tarred Rope and Ratline.....	12 1/2
Spun Yarn.....	12
Bolt Rope.....	12
Marline, Houseline, Rounding and Hambroline.....	15
Packing.....	16
American Hemp.....	16
White Rope.....	18
Tarred Rope and Ratline.....	12 1/2
Spun Yarn.....	12
Lath Yarn.....	12 1/2
Packing.....	17
Marline, Houseline, Rounding and Hambroline.....	16
Sash and Bell Cord.....	25 to 35
Italian Hemp.....	16
Packing.....	20
Tarred Rope.....	16
Rope and Packing.....	8
Oakum.....	8
Best Oakum.....	8
U. S. Navy.....	7 1/2
Navy.....	6 1/4

These prices were adopted by the associated manufacturers, to whose meeting we referred in our last issue. Their number has been increased by the accessions of several concerns who have heretofore been outside. The organization is to continue for three years from July 1, and will probably insure a fair stability in the prices of Cordage.

### IRON RIVETS.

The following are the prices for Iron Rivets and Burrs adopted by the associated manufacturers at their late meeting:

	Dis. per cent.
Black and Tinned Iron, Flat Head M. Rivets (in packages and bulk).....	50
Block and Carriage (in C packages).....	50
Iron Rivets (other than above) in bulk.....	45
Black and Tinned Burrs.....	45

The American Screw Company, in their circular, July 1, quote the same prices in the following form:

	Dis. per cent.
Ordinary, in Bulk.....	45
Cooper, in Bulk.....	45
Thousands, in Bulk.....	50
Thousands, in Papers.....	50
Block and Carriage, in Papers.....	50
Hame, in Papers.....	45
Belt, with Burrs, in Papers.....	45
Burrs, for Rivets, in Papers.....	45

The quantity discount of 7 1/2 per cent. to parties purchasing and receiving \$250 worth or more of Iron Rivets and Burrs during the six months ending January 1 and July 1 is continued.

### CAST BUTTS.

At the meeting of the manufacturers of Cast Butts, which was held in this city last week, the following prices were adopted, with an additional 10 per cent. for cash:

	Discount per cent.
Cast Narrow Fast Joint Butts, Drilled and Wire Jointed, No. 83.....	60
Cast Broad Fast Joint Butts, Drilled and Wire Jointed, No. 82.....	60
Cast Narrow Loose Joint Butts, Drilled and Wire Jointed, No. 83.....	70
Cast Broad Loose Joint Butts, Drilled and Wire Jointed, No. 84.....	70
Cast Parliament Butts, Drilled and Wire Jointed, Nos. 78 and 85.....	70
Cast Mayer's Hinges, Drilled and Wire Jointed, Nos. 81 and 86.....	70
Cast Loose Joint Plain Acorn Butts, Drilled and Wire Jointed, Nos. 94 and 95.....	70
Japanned Loose Joint Butts, without Acorns, Nos. 54 and 57.....	70
Japanned Loose Joint Butts, with Japanned Tips, Nos. 55, 58 and 88.....	70
Japanned Loose Joint Butts, with Silvered Tips, Nos. 56, 59 and 79.....	70
Japanned Fast Joint Butts, without Acorns, Nos. 60 and 61.....	60
Japanned Fast Joint Butts, with Japanned Tips, Nos. 62.....	60
Japanned Fast Joint Butts, Narrow, No. 81.....	60
Figured Loose Pin Butts, with Tips, Nos. 63 and 90.....	70
Figured Loose Pin Butts, with Japanned Tips, Nos. 64 and 91.....	70

Figured Loose Pin Butts, with Silvered Tips, Nos. 65 and 92.....	70
Figured Loose Pin Butts, without Acorns, No. 66.....	70
Figured Loose Pin Butts, without Acorns, Japanned, No. 67.....	70
Japanned Parliament Butts, without Acorns, No. 79.....	70
Japanned Parliament Butts, with Japanned Acorns, No. 76.....	70
Japanned Parliament Butts, with Silvered Acorns, No. 77.....	70

### ITEMS.

Theodore Weed, formerly manager of the New York office of the Northampton Cutlery Company, was on July 1 elected treasurer of the Hunter Keller Mfg. Co., manufacturers of Wrought-Iron Pipe and Connections, 142 and 144 Centre Street, New York.

Under date June 29, Hibbard, Spencer, Bartlett & Co., Chicago, issue a 12-page illustrated circular devoted to Tin Plates, Tinner's Stock, Belting, Binder Twine, Apple Parers, Brass and Maslin Kettles, Fruit and Jelly Presses and other seasonal goods.

J. L. Bonnett, Baltimore, Md., has recently moved into a new store on the northwest corner of East and Ensor streets, where he has a stock of Farmers', Builders', Blacksmiths' and Coachmakers' Hardware, &c., to which he calls the attention of the trade, and on which he announces that he is prepared to make exceptionally satisfactory prices.

INDIANAPOLIS, IND., July 6, 1885.

To the Trade: You are hereby notified that the Alarm Till Lock and Money Drawer, made and sold by the DeLavergne Works, of New Jersey, is an infringement upon the rights secured to us as the owners of Re-issued Letters Patent No. 5566, dated September 9, 1873.

The Drawer as sent out by the DeLavergne Works is stamped as patented September 22, 1874, and July 23, 1878.

These are the dates of the original and subsequent patents issued to Milo L. Morgan, and the Lock is what was known as the Morgan Lock, although the Drawer upon which it is placed is called the Defiance Money Drawer. Some years since we brought suit in the United States Circuit Court, at Chicago, against Albert M. Gilbert, for the infringement of our patent, the said Gilbert being then the agent of the Howe Scale Company, and, as such, engaged in selling various Alarm Till Locks, among which was the Morgan Lock, patented September 22, 1874; and on the 25th of March, 1879, a decree of perpetual injunction was rendered in that case against Gilbert, enjoining him from selling either the Morgan or the Wood Locks, on the ground that they were an infringement of the reissued letters patent above mentioned, which were therein adjudged to be valid, and judgment for \$585 damages and \$91.16 costs was rendered against said Gilbert in favor of the owners of the patent. The present Lock made by DeLavergne is only a colorable evasion of our rights, and the trade is hereby notified that we shall prosecute for infringement any and all persons engaged in the manufacture and sale of the DeLavergne Defiance Money Drawer having this Morgan Lock attached. We do not court notoriety, nor do we seek to persecute anybody, but we are determined that our rights shall not be infringed nor impugned by a set of men who seek to appropriate our invention without right or license from us. As soon as we can ascertain the names of the leading persons handling these DeLavergne Locks we shall commence the proper legal proceedings to restrain them. This circular is issued to the trade in hopes that it may prevent innocent and otherwise well-disposed persons from handling or dealing in this infringing device. For fuller information we herewith submit a copy of the decree of the United States Court in the case against A. M. Gilbert, above referred to. Yours respectfully,

The following from the London *Daily News*, June 12, refers to the exhibit of a well-known American house at the Inventions Exhibition:

Next to that of the Waltham Watch Factory, the most noticeable stand in the American Court is that of the Yale & Towne Mfg. Co. Locks and Keys may not seem to furnish promising material for attractiveness at a popular exhibition, but here, again, the exhibitor's "know how to do it," and the Yale show, apart from the singular ingenuity of the articles shown, cannot fail to arouse the attention of a passer-by from its exquisite neatness and artistic display. The new Yale Lock and Corrugated Key is the most important addition to the safety mechanism in Locks and the most radical improvement in Keys which have been made since the introduction of the original Yale Lock, with its small, flat Key of sheet metal, revolutionized the art of Lock-making in America.

THE TUCKER & DORSEY MFG. CO.

of Indianapolis, Ind., have issued the following circular to the trade, relating to their patents on Money Drawers, and calling attention to alleged infringements:

INDIANAPOLIS, IND., July 6, 1885.

To the Trade: You are hereby notified that the Alarm Till Lock and Money Drawer, made and sold by the DeLavergne Works,

upon the 25th day of March, A. D. 1879, in the cause wherein William H. Tucker et al. are complainants and Albert M. Gilbert is the defendant, as the same appears from the original records of said court now remaining in my custody and control.

In testimony whereof, I have hereunto set my hand and affixed the seal of said court, at my office in Chicago, in said district, this 29th day of March, A. D. 1879.

WILLIAM H. BRADLEY, Clerk.

### THE RIOT IN CLEVELAND.

The riotous attack in Cleveland, Ohio, upon the factory of the Union Steel Screw Works and upon the works of the H. P. Nail Company forms the subject of much indignation.

The rioters are in no sense complimentary to the authorities in Cleveland. Disturbance had been threatened for several days, but it was not until Tuesday last, when some 2000 armed men listened to a furious harangue by Karl Palka, agent for the Anarchists' committee, that the aspect became serious. The mob first drove out the workmen in the Nail factory, several of whom stood manfully by their machines until it became evident that resistance was useless. The Chisholm Shovel Works were the next object of attack, but the building having been vacated, under timely notice, the body of strikers gathered before the Screw Works, threatening the destruction of the building, all the doors being barricaded. Fayette Brown, president of the company, who is also known as the receiver of the Youngstown Iron firm of Brown, Bonnell & Co., resolutely withstood the demands of the rioters for admission, whereupon the doors were battered down and Mr. Brown was violently assailed. Had not one of the strikers interposed, it is not unlikely that a brutal murder would have taken place, the victim one of the most prominent citizens of Cleveland and one of the most enterprising and worthy, whose only crime was that he attempted the defense of the lives and property of those for whom he was responsible. After the building had been cleared by the rioters the tumult gradually subsided. Fears were entertained that the difficulty might be renewed to-day, but thus far they have not been realized. The assault on Mr. Brown, with the other lawless acts of the strikers, has doubtless had the effect of changing sympathy for their real or supposed grievances into indignation against their methods, and has led to the adoption of measures against a renewal of their riotous performances.

### COES' WRENCHES.

The following circular relating to Coes' Wrenches has been issued, continuing the present prices:

### To the Trade.

NEW YORK, July 1, 1885.

We are instructed to confirm existing prices for Coes' Genuine Screw Wrenches, of either make, including L. Coes & Co.'s Knife Handle, at 60 per cent. discount from list. "Mechanics" Wrenches, made by L. Coes & Co., and similar quality by A. G. Coes & Co., will continue to rate at 10 per cent. less than the "Genuine." A special discount of 10 per cent. will be allowed on specified orders for 50 dozen, for immediate shipment. Terms, 90 days, or 3 per cent. discount for cash in 10 days. Parties having purchased the quantity will be entitled to the extra discount on subsequent orders during balance of season ending December 31, 1885. Above quantity must be taken from either one or the other manufacturer, and includes only the Coes' "Genuine" Pattern, or L. Coes & Co.'s Knife Handle, and not the "Mechanics," made by A. G. Coes & Co., or a similar quality made by L. Coes & Co., the price of either being 10 per cent. less than the "Genuine," and are subject to the same quantity schedule.

### DUBBLE & McCARTY,

Agents for L. Coes & Co.

### JOHN H. GRAHAM & CO.,

Agents for A. G. Coes & Co.

### WHAT THE TRADE SAY.

A correspondent who has, it will be seen, experienced some embarrassment on account of the difficulties of the Screw situation, and is perplexed in regard to the prices of other lines, writes as follows:

We think the prices of Screws will stiffen up very soon from the fact that several transfers of Screw factories have taken place recently, apparently indicating a sickness in the business. We have no large demand for them, and, of course, were fools enough to buy at a discount 85 and 10 per cent. all we wanted and a good deal more. On Locks we have no reason to doubt that the advance is real; at least we have no confidential discounts for immediate orders named us, with advice of the advance. We hope it is an advance for good. Hardware is too cheap, and people are harder to please than when prices were twice as high. Strap Hinges seem to be firm at the advance. Cartridges are wild, and we wish some one would advise us what to do. We will divide the profits to any one who will guarantee to hit the market right.

might have done with advantage to themselves and their customers. It is doubtful if there would be any considerable increase in the demand for English Cutlery were the duty removed, as the advantage which this once gave the manufacturers here has been more than surrendered to the consumer in the prices established by domestic competition. English styles in Table Cutlery cannot compete with ours in suiting the popular taste, and the growing export trade in American goods of this class, especially to South America, shows that we are making headway against competition on neutral ground.

YANKEE BLADE.

AMERICAN MANUFACTURES IN NEW ZEALAND.

A correspondent of the *Sheffield Telegraph*, who signs himself "A Sheffield Smith," speaks of the successes of American manufacturers of various classes in meeting the wants of the British colonies in Australia. He says:

The same cause seems likely to act here as it did between us and the United States years ago, resulting in our loss of American trade—namely, for persistency in not supplying goods to order. I heard Sir Julius Vogel say in a public meeting in Auckland that the Government had sent an order for some Locomotives to an English firm, with all plans and details, as to size and weights, to the greatest nicety. On the orders being ready for embarkation, the makers advised the Government that it would be necessary for all bridges, culverts, &c., to be strengthened here, on account of the great weight of the engines. The Government replied by telegraphing a countermand of the orders, and they got exactly what they wanted from America. I know of some Hammers ordered from here to be made in Sheffield. The things came, and will not sell because the makers' preconceived judgment on what the colony wanted overruled the strict letter of the order. Believe me, the colonist knows what he wants, and will have nothing else, and if it suits him the price is out of the question. I am writing from what I hourly experience as a "Saw doctor." I hear the criticisms of all conditions of men on our Tools. A Claw-Hammer without an Adze head is treated with contempt by carpenters here. Then, Sheffield Edge Tools must be of the right sort of stuff, for in kauri-cutting a special edge is required. It cannot be too hard if it is not brittle. Kauri is unlike all other timber from the amount of silicon in its composition, which takes away the cutting edge of any Tool that is under proof. I daily meet with proofs that in modern Sheffield Tool-making there is a declension. How comes it that an old R. S.—Saw, or a S—J—, is superior to a new one in temper? (Pardon the personality—truth before all things). I submit there was more care taken in the past in the tempering of them. Special Tools will have to be made for special work. That which may be well and good for a ship carpenter, who works up a good deal of rata, may be quite unfit for a joiner or cabinet-maker, who is constantly on with streaked, waved or mottled kauri. Were Handsaws a quarter of an inch narrower at the point, two gauges thinner from thence upward, giving all possible weight in the hand, even a heavier handle, with a higher temper, with a set close on the point of the tooth, the cutting face of the tooth square, the rear swaged to 45° angle, then we should have Handsaws fit for the kauri trade. Nothing but the deepest devotion to the interests of the trade of my native town would induce me to make these structures on the imperfection of its manufacturers. I would further suggest a desideratum felt here in a Claw-Hammer, to supply which old Sheffield is equal. Those of which I have spoken will stand on their heads when dropped so. Now, one is wanted self-balancing, so that, when the carpenter has dropped his Hammer when he is flooring, by swinging his arm he can catch it up; at present he must grope for it down on the floor. I have the opinion of a host of carpenters on this subject. The amount of Nail driving done in this Province of Auckland and Northern New Zealand would be incredible were I to state it, but workpeople for the most part live in what I may call "packing boxes," made entirely of timber. It will be seen at a glance how important this is to the Saw, Edge Tool, Hammer, and Wire-Nail trade. The Germans put in an appearance as competitors in the cheaper Tools; but from what I learn from those who use them, one trial is sufficient. Not so with our American cousins. Besides, they are rapidly developing native industries, which the Government is disposed to encourage. I saw a large Iron works recently at Onehunga, 8 miles from here, getting ready to start, with rail and sea beach for modes of locomotion; but a narrow isthmus separates sea from sea at this place, and it is projected for cutting through when the coin comes in. There is room for any amount of enterprise.

#### HARDWARE IN AUSTRALIA.

From a recent issue of the *London Ironmonger* we make the following extracts in regard to the condition of trade in Australia, the views given being those of a member of the firm of Brooker, Dore & Co., London, who has recently made an extensive tour in the Australasian colonies:

With regard to foreign competition, the Germans are strongly competing in Fencing Wire, and have almost ruined the trade by cutting prices to such a fearful extent; but the German Wire is of such uncertain quality that merchants prefer to buy and consumers prefer to use English Wire wherever it is possible to do so. In regard to American Axes, Hatchets, Shovels and Spades, so much has been said that I need hardly do more than express my belief that there is a great disposition among the merchants and Ironmongers in the colonies to deal with England if they could, but the consumers will insist upon having American make. It is quite a mistake to say that the merchants have not done their duty to the makers. On the contrary, they have done a great deal to inform the English manufacturers as to what is really required, and they would have done more had the makers been inclined to listen, and not be so perverse and obstinate in sticking to their old

patterns. On the score of quality and price there is now scarcely any difference, and I repeat that, if the English makers would go into the matter as they ought to do, they would find in time that they would get back a good share of the trade. In some kinds of Locks the Americans have secured a good footing in the colonies, and many of their patterns are better, and their boxing and general attractiveness are superior to some of the English. But, so far as Rim Locks are concerned, the British makers still retain the bulk of the trade, and "No. 60" Real Patent Rim Lock still holds its own. There is, however, a prospect of a stronger competition with the Americans in Brass Locks, owing to the low price of Copper in the States, and I would warn the English makers to be on the *qui vive*. In Plated-ware I do not think that England has much to fear from America, except in the commoner grades. But the Americans are sending out some splendid pattern books, with patterns and designs far ahead of our makers in corresponding qualities. In Hollow-ware the firms of Messrs. Clark, Kenrick and Baldwin keep the lead, but in Enamelled and Tinware the Germans are competing with a fairly good quality. However, the Anglo-American Company's and other English makers still command the preference. In Cast Butts Messrs. Baldwin's numbers still hold the first position. In Scales and Safes Messrs. Fairbanks and Messrs. Howe are shipping pretty largely in Scales, and the "Marvin" Safes are finding a market; but, on the whole, the English makers hold their own. As to Reapers, Binders, Plows and the like, I need not say much, as the Implement question has been so fully discussed. I was glad, however, to hear a good report of the new "Hornby" Binder, and that it had been so successful against the American Binders. In Steel and Files there is an increasing demand for the higher and best qualities, and this country has it all its own way, except as regards a little German competition, which, however, is mostly in the commoner descriptions. Thomas Firth & Sons' Steel and Tools are in high favor, and bear a reputation second to none. In Saws Messrs. Disston, Philadelphia, do a large business; but, although there is no equal competition in favor of the Yankee, it is sufficiently severe to necessitate its being watched.

#### The Third Avenue Cable Road.

Years ago the Third Avenue Surface Railroad Company purchased for \$65,000 a franchise giving them the right to 125th street from river to river, and Tenth avenue from 125th street to Harlem River. Two years ago, after many meetings, the directors concluded to establish a cable road over this entire route, abolishing the horse line that runs on 125th street at present. A year ago last spring work was begun, and two tracks were laid from 187th street and Tenth avenue, intersecting the old line at 125th street. They bought the block between Ninth and Tenth avenues, and 128th and 129th streets, at a low figure. This was just the site needed for the motive-power and the storage of cars.

This structure of brick, terra-cotta and iron covers a plot of ground 200 feet square, is one story in height over all, with a second story in the center front, 50 x 50 feet, to be occupied as a clock tower and offices. The cellar, at a depth of 21 feet, gives a space in front of 100 x 50 feet for the machinery, the central a series of vaults for coal, and the rear to the four boilers, each 10 x 5 1/2 feet, capable of carrying 160 pounds pressure. From this end of the building rises a circular chimney to a height of 150 feet above the street level. Every part of the machinery and gearing for the running of the road is in duplicate, even to the cables through the streets. This obviates the necessity of bringing the road to a standstill in case of repairs. The drums, over which the cables make five turns each, are 13 feet in diameter, while the fly-wheels of the engine measure 18 feet in diameter and 18 inches in width, and weigh 40,000 pounds each. The engines are of 360 horse-power, but with a rate of speed averaging 8 miles per hour, as is intended, 200 horse-power will only be used. The "tension boats," or wheels, which hold the cables taut are 10 feet in diameter, and run through a sluiceway 75 feet in length. The first floor is set apart for the storage of cars. Large excavations have been made under 125th street and Tenth avenue, also at the terminus at 187th street. At the former place a vault 10 feet in depth, 80 feet in length, 50 feet wide at one end and 25 at the other, contains the necessary carrying and corner-turning wheels or sheaves. At the terminus this subterranean passage is 60 feet long by 25 feet wide, and likewise filled with running gear. Between the tracks and at a distance of every 35 feet are "manholes" containing the two carrying sheaves over which the two cables run. Nine hundred of these are found between 125th and 187th streets, a distance of about 3 miles. It is proposed to open the Tenth avenue section to the public first, when horses will be used to draw the cars on 125th street from Eighth to Tenth avenues. The entire route will probably be in operation by next fall. The grip has been a source of some trouble. The one which will probably be used consists of an iron block 2 feet long and 3/4 inch in thickness. This enters the cable slot to about the depth of 2 feet, and supports two "jaws," the upper and lower. The latter is stationary, the former having a vertical motion. Between these the cables, being "gripped" or loosened by the raising or lowering of the upper jaw. While the majority of the cars will have this attached to the bottom in order to facilitate travel, five "dummies" will be used, so that four or five passenger coaches may be converted into a train.

A process of making dichloride of copper for treating ore has been patented by A. Patchen, of Westfield, N. Y. The apparatus for carrying out this process consists of a cylindrical vessel containing a charging hole at the top, a tap hole at the bottom and a steam supply-pipe extending from the top to a short distance above the bottom. The metallic copper, together with chloride of

sodium, sulphate of copper and water, is placed into the cylinder and the latter is closed tightly. The mixture is then heated by means of steam introduced through the steam-pipe. By reason of the confinement of the mixture and the closeness of the apparatus the mixture is likewise subjected to steam pressure. The claim of the patent covers the process of treating sulphate of copper in the presence of salt, water and metallic copper under pressure and with heat.

#### METALLURGICAL NOTES.

##### Some Experiments on the Power Required to Roll Rails and Tees.

It is a fact that thus far very few investigations have been made to ascertain the power required to roll iron and steel. The latest, and in many respects the most complete, piece of work in this direction has been done by Prof. J. Thime, of the St. Petersburg School of Mines, at the Putilow Works. The Bessemer plant and rail mill were built by J. Cockerill, of Seraing. The rail mill is driven by a reversing engine, so that the carrying out of indicator trials is more easily effected than with a fly-wheel engine. In the case of the latter special arrangements are necessary in order to measure the difference in the velocity of the fly-wheel before and after every pass. With the help of the Richards indicator, the power required for every pass through every groove was found. Since a fresh sheet of paper was wanted for every diagram, it was impossible to get indicator cards for all the successive 11 grooves on one rail. By rapid work it was possible to secure three cards from one rail. It became necessary, therefore, to take a large number of cards, 160 of them, so that several were available for every groove, even if taken while rolling different rails. A fair average was thus possible, especially since the size of the ingots, the degree to which they were heated, and the time consumed in rolling varied, little.

The rail ingots at the Putilow Works are 14.5 inches square at the thick end, are 39.4 to 42.3 inches long and weigh 1841 to 1874 pounds. They are broken down in a reversing blooming mill having four grooves, with 14 passes, turning out a bloom 7.125 inches square and 120 to 132 inches long. No indicator cards could be taken from the blooming train, because there was only one orifice provided on the cylinders. From the blooming train the steel goes to reheating furnaces, and then to the finishing train. The latter is driven directly, without the intervention of gearing, by a two-cylinder reversing engine of 1800 horse-power. The cylinders are 45.25 inches in diameter and 72 inches stroke, the speed varying between 40 and 50 revolutions. The pistons, made of cast iron, are exceptionally thick, with the object, apparently, of avoiding the wear of the lower half of the cylinder. This, however, was not well attained, since after two years' working the lower inner surface of the cylinders are worn, while the upper surface is dull. It would have been better to take the piston rods through both cylinder-heads and arrange for guides behind the cylinders. The distribution of the steam is effected in each cylinder by a double slide-valve. The cut-off is small, is not variable, and is effected by outer lap. A throttle valve, consisting of a counterbalanced double-beat Sulzer valve, serves for regulating. Each of the two double slide-valves receives its motion from two eccentrics through the intermediary of an Allan block. A small steam cylinder, 7 inches in diameter and 18.1 inches stroke, reverses the two blocks. The valve of this auxiliary cylinder is moved by hand. A hydraulic cataract applied to it had the sole object of cushioning the blows in reversing the blocks. The main slide-valves used are of the gridiron type. The boiler pressure is to 65 pounds.

A series of cards were taken when the engine was running light. They are irregular in form, because the inlet-valve is opened only a little, the steam is wire-drawn, and is partly compressed when exhausting. The following are the results of observations, taken chiefly during the time when the change from day shift to night turn was going on:

No. of revolutions per minute.	Mean of piston pressure, feet per second.	Maximum piston pressure, feet per second.	Average pressure on piston, lbs. per square inch.		Indicated horse-power.
			Spiral No. 4.	Spiral No. 3.	
10.....	32	3	1.45	1.077	22.66
20.....	6	1.49	1.513	45.32	
30.....	9	2.252	1.86	67.58	
40.....	12	2.2	1.867	94.44	
50.....	10	1.5	2.1	113.2	
60.....	12	1.8	2.372	135.96	
70.....	14	21	2.372	158.62	
80.....	16	24	2.055	1.616	181.28
90.....	18	27	1.417	203.94	
100.....	20	30	1.541	226.6	
Average.....			1.968	1.907	

The following table gives the results of the tests made when the rolls were driven empty:

No. of revolutions per minute.	Mean pressure, in. per sq. in.	Total indicated horse-power.	Power required to move rolls.
10.....	9.2	31.2	5.54
20.....	6.65	61.4	16.98
30.....	2.54	93.6	26.02
40.....	2.71	124.8	34.16
50.....	2.86	156	42.7
60.....	3.15	187.2	51.24
70.....	2.723	317.4	58.78
80.....	1.745	349.6	66.32
100.....	2.361	312	58.4

In the first series the gauge at the engine showed a pressure of 35 to 45 pounds, while in the second series it was 54 to 57 pounds.

The blooms leave the mill with a section of 7.125 inches square. Since an attempt to measure exactly the length of every bloom when being rolled into rails would have seriously interfered with the work, two blooms, representing the maximum and minimum were chosen, and their length after every pass measured as carefully as it

was possible. The results are embodied in the following table, the mean values serving as the basis in the further computations:

Pass.	Length after pass through rolls, meters.	Stretch after every pass.
1.....	3,048	3,032
2.....	3,444	4,028
3.....	4,358	4,928
4.....	5,312	6,311
5.....	6,606	8,033
6.....	7,895	9,437
7.....	9,397	10,365
8.....	10,058	11,734
9.....	12,75	14,569
10.....	14,77	17,205
11.....	19,964	22,70
12.....	21,312	24,817

Mean.....

A series of observations was made to ascertain the time required in passing through every groove, with the following results, given in seconds:

Pass.	Time of rolling, seconds.	Average.
1.....	316 41 38 36 34 32 30 28 26 24 22 20	316 41 38 36 34 32 30 28 26 24 22 20
2.....	452 53 51 50 49 48 47 46 45 44 43 42	452 53 51 50 49 48 47 46 45 44 4



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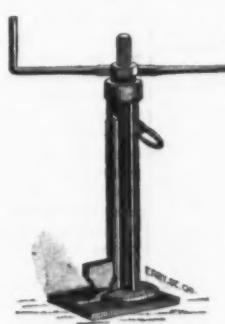
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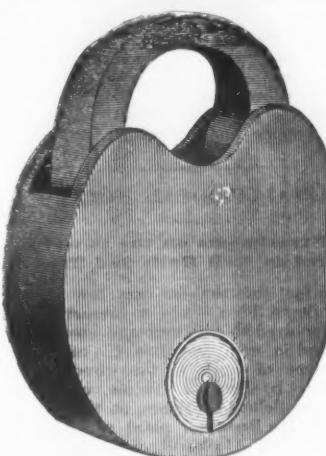
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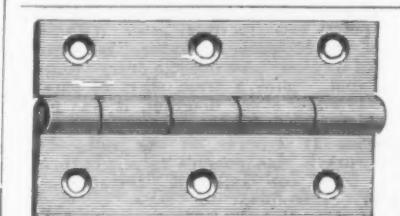
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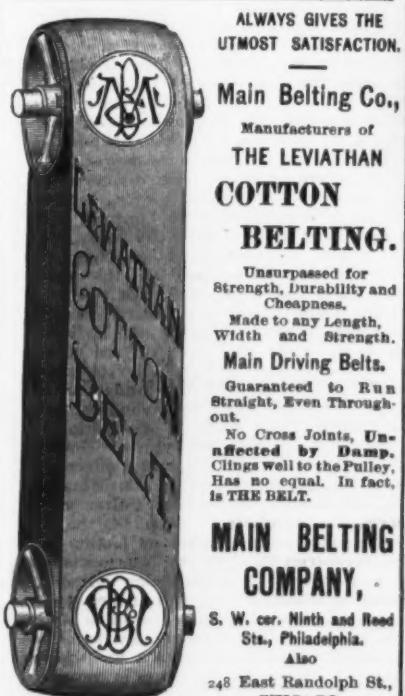
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## INDUSTRIAL ITEMS.

## MAINE.

A new company with \$60,000 capital has been organized to rebuild and operate the Katahdin Furnace, and work on rebuilding will be begun at once. Mr. O. W. Davis, Jr., will be general manager, with office at Bangor, and Mr. Ernst Sjöstedt, late of the Cherokee Iron Works, Ga., manager at the works.

The Consolidated Electric Light Company, Portland, after trying for two years long and short stroke engines, have decided to increase their power by adding more Armstrong & Sims high-speed engines.

The friction feed and run-back for saw-mills, made by Jos. Perry, Gardiner, is a great saving of labor, and as a consequence he has sold a large number. The "Standard set and Champion dog" is another of his specialties, besides which he is a manufacturer of shingle machines, shipping them to all parts of the country. Mr. Perry started about 50 years ago and has transacted business on nearly the same spot ever since.

## NEW HAMPSHIRE.

The Concord Machine Works, of Concord, owned by John A. White, has resumed the manufacture of mowing machines after a discontinuance of that department for two years.

## MASSACHUSETTS.

The Cleveland Machine Works, manufacturers of woolen machinery, Worcester, are running their shops full time, giving employment to about their usual force of hands. They report their business fully up to what it was last year at this time, and expect to be able to run full time through the summer. They have recently brought out several improved machines, one of them in particular a spooler, which are meeting with a rapid sale. The machinery manufactured by this concern is second to none made in this country for working wool, and is becoming very popular with our woolen manufacturers.

There is a reported improvement in the business of the Mason Machine Works, of Taunton. The demand for printing presses has increased considerably, and they have recently taken quite a large contract for cotton machinery for the Lyman Mills, Holyoke, so that they are fairly busy except in the locomotive department. They are running full time with about 650 men.

The Old Colony Iron Works, Somerset, have shut down for two weeks, and it is reported that the Mount Hope Iron Works will follow suit.

The nail mills of Fall River shut down on Tuesday of last week for an indefinite length of time.

Valley Machine Company, of Easthampton, are turning out special fire pumps after the design of their "Acme" boiler feeders, for the New Jersey Rubber Company, of New Brunswick, N. J., and the Connecticut River Lumber Company, Mount Tom, Mass.

## CONNECTICUT.

The Kent Furnace went in blast July 1.

The Humphreysville Mfg. Co., Seymour, are having a new wheel made for their auger and bit shop, and will run by steam while the old one is being removed. The wheel now in use was made more than 40 years ago, and has done good service. It was made by Fred. Paine, of Waterbury, who is also making the new one.

## NEW YORK.

The gas furnace recently built at the Syracuse Tube Works is reported a failure, and the company are now tearing it down.

The Cedar Point Furnace, now out of blast, will be blown in shortly.

A second stack is to be built at the Chateau-garnier Furnace.

## NEW JERSEY.

Messrs. Gordon, Strobel & Laureau have made arrangements with Messrs. Cooper, Hewitt & Co., to put up one of Gordon's patent converters at the Trenton Iron Company's Works, Trenton. Work has already been commenced on the plant, which is expected to be in operation within six weeks.

The Franklin Furnace is now being repaired, preparatory to resuming blast.

The Secaucus Furnace was blown in in June.

The plant of the New Jersey Zinc Company has been entirely remodeled. Two of the three small stacks have been taken down and replaced with one somewhat larger. One stack is in blast, and the second will be about August 1st.

The Passaic Zinc Works shut down on June 30th indefinitely. Two hundred and twenty-five workmen were thrown out of employment. The works have been in constant operation, day and night, for 30 years, during which time there has never been a strike. Dullness of trade is given as the cause of suspension.

## PENNSYLVANIA.

The old Ringgold Furnace in the Schuylkill Valley, is now known as Helena Furnace.

The Mt. Penn Stove Works, Reading, Pa., have suspended operations in all departments until the new warehouse is under roof and has the flooring completed. The place will also be rearranged, and it is expected the works will resume in about a week or 10 days.

The Pioneer Furnaces, at Pottsville, have shut down temporarily, throwing a large number of hands out of employment. The furnaces are undergoing some repairs, and will be blown in again as soon as completed.

An amended statement has been filed in the Lawrence County Court by the Wampum Wire Company, Limited, which records an increase of stock to \$15,000, divided into 156 1/2 shares. This is an increase of \$5,000.

The Ellin & Lessig Steel and Iron Company, Limited, of Pottstown, have received several large orders from Western parties.

A New Castle letter, dated June 29, says: "One of the liveliest meetings of Councils ever held in New Castle was held to-night,

when the question of natural gas came up for discussion. The Shenango Gas Company, which recently struck a good well within 10 miles of the city, were granted the right to lay their mains in the streets, alleys and lanes of the city. The company is composed of Andrew Mellon, A. J. Pickett and the Fisher Brothers, and work will be commenced at once. At least 200 citizens, including nearly the entire Board of Trade, were at the meeting, and what was feared to be a scheme to defeat the natural-gas ordinance failed to materialize in the presence of these citizens." It has since been reported that the well referred to shows symptoms of turning out an oil instead of a gas well.

The new shop of Orr, Painter & Co.'s stove works, Reading, closed on Saturday evening, June 27, for several weeks, this being the annual closing time.

The Franklin Natural Gas Company, of Venango County, have been chartered. Chas. W. Mackey, is the largest stockholder, having taken \$40 of the 1000 shares subscribed. The capital stock is \$50,000.

The Phoenix Iron Company are building another large Siemens furnace in the new mill, which will be used for heating iron for rolling into small bars and rounds.

The Reading Electric Light Company have made arrangements by which they can furnish from 1 to 100 light dynamos to persons who may want to run their own electric lights. This will be a great advantage to parties operating large mills, factories, &c., where spare motive-power may be utilized in running the dynamos.

At No. 2 Stack, of the Colebrook Furnaces, Lebanon, a ton of pig iron was made with 1 ton and 40 pounds of coal, which is said to be the best ever done with Cornish wall ore. No. 1 Stack will be put in blast in about a week or ten days.—*Reading Eagle*.

The Meller Foundry and Machine Company, of Reading, are making preparations to begin the erection of extensive new buildings on the tract of land they recently purchased of the Hauser estate on the line of the Schuylkill and Lehigh and the Reading and Pottsville railroads, beyond Bridgeport. Twenty-five men are employed in making the proper grading for a siding, with two branches, to extend through the grounds. The main siding will connect with the Schuylkill and Lehigh road and be about 2000 feet, while each branch will be some 700 feet long.

The Barree (charcoal) Furnace, one of the oldest in the State, will probably never blow again.

The Mont Alto Furnace is again in blast.

The Pine Grove Furnace is running on a mixture of coke and anthracite.

Both of the Colebrook Furnaces are now in blast.

The Edge Hill Furnace is about ready to blow in again.

The Duncannon Furnace was to blow out July 1.

The Little Mill of the Allentown Rolling Mill Company shut down on the 3d, running two weeks to fill a few orders.

Stack No. 5 of the Allentown Iron Company has been relined and otherwise put in proper condition, and was lighted up on the 3d.

The foundry of Rick Bros.' Hardware Works, at Reading, is closed temporarily for repairs.

Repairs are being made to No. 3 Stack of the Glendon Iron Company, preparatory to restarting the same.

It is reported that some New York capitalists have an eye on the mill at Allentown, now idle for four years.

A new suspension bridge, 968 feet long, is to be built over the Lehigh River, at Easton, at a cost of \$23,000.

## PITTSBURGH AND VICINITY.

The Keystone Bridge Company last week began rolling the massive steel girders, 4 feet deep, that form the anchorage 62 feet below the summit of the pedestal of the Bartholdi Statue.

Booth & Flinn are now burning brick with natural gas.

The Philadelphia Company struck a paying vein of gas last Saturday on the Fundis property, at Murrysville. This well is known as No. 5. They are putting down a new well, to be known as No. 6, on the King property, and have commenced laying a 10-inch gas line to the city. The Penn Fuel Company have a derrick up, ready to commence drilling, on the Howard property, three-fourths of a mile northeast of Murrysville.

The green-glass bottle factories in the Pittsburgh district have closed down for the regular summer vacation—until September.

Sixty per cent. of the ovens controlled by the Connellsburg Coke Syndicate and Producers' Association ran five days during the past week. Trade is gradually increasing, and after the week's orders were filled on Saturday there was little coke in the yards. Should there be a further increase next week it is thought 10 per cent. more of the ovens will be put in blast, leaving 30 per cent. idle. A leading producer says there were very good prospects for an excellent trade in coke during the summer and fall.

The Allegheny County Light Company have declared a semi-annual dividend of 3 1/2 per cent., an increase of 1 per cent. per annum.

The Spang Steel and Iron Company have completed an order for 50 tons of steel shapes to be used in connection with the Bartholdi Statue. The shapes weigh from 1000 to 2000 pounds each.

The Philadelphia (Westinghouse) Gas Company have removed three of their competitors out of the way by the purchase of their franchises for \$100,000. The companies in question are the Acme Gas Company, the Acme Fuel Company and the Braddock Gas Company, which corporations were chartered in 1883, but had been in operation for a con-

siderable time previous. The negotiations for the purchase have been conducted during the past two weeks, but were not consummated until last week, when the papers of transfer were signed and the transfer finally made to the Philadelphia Company for the figure stated. It is now rumored that the Philadelphia Company have succeeded in arranging for a consolidation with the Penn Fuel Company.

Messrs. Seaman, Sleeth & Black, of the Phoenix Roll Works, state that they have melted more metal during the last three months than during any other similar period within the last four years, and they have just put on an extra force of men. This increased business, they state, is owing to the growing demand for their semi-steel chill

Graff, Bennett & Co. have presented a petition in court asking that a deed of conveyance be given them for one-fourth interest in the Paulding Furnace, Paulding County, Ohio, that they bought of Wm. A. and Mary Rodgers, bankrupt, for \$50, on September 10, 1875. J. B. Finley, the surviving assignee, was authorized to deliver the deed.

## OHIO.

The statement that the steel-works strike at Bellaire had been settled by the management agreeing to recognize the Amalgamated Association is not only misleading, but untrue. The question at issue has not been the recognition of the Amalgamated Association, but the discharge of four men whom the lodge was determined to have reinstated. The company posted a notice calling a meeting of the steel workers at their warehouse on Thursday, June 25. It was responded to by more than 100 men. After a statement was made by the president of the company, the men agreed to go to work, regardless of the action of the Amalgamated Association.

A notice was then posted calling upon parties who so desired to resume work upon the following Monday morning, and a sufficient number presented themselves to enable the works to start on Monday morning, single turn, without reference to the decision of the lodge. In the meantime the president of the Amalgamated Association arrived, and, after an investigation, withdrew the four objectionable men, thus sustaining the company and enabling the Amalgamated men to resume work.

We learn that a new foundation will be laid for the Forest City Mill, at the Union Crossing, and an entire new roof put on the mill, and other repairs and alterations made, preparatory to starting up, which is not expected to take place until fall.—*South Cleveland Advocate*.

The New Hamilton Furnace, at Hanging Rock, has not yet been put in blast. But 4 of the 15 Hocking Valley furnaces are in blast.

The Ironton Furnace Company have rechristened their furnace "Meta." Meta has been in blast two weeks and is doing well, making 210 tons per week of good foundry iron.

Morehouse & Bernard, of Buffalo, have leased the old pump works building, in Youngstown, and are preparing it to be used as a nickel-plating works. They expect to be ready to start by July 15, and will do business under the name of the Youngstown Nickel Plating Company.

The Crystal Window Glass Works, of Bellaire, will begin the erection of a slack furnace, the first in that neighborhood, next week. The intention of the managers is to use slack coal, hoping by this means to reduce the cost of manufacturing the glass to the figure it is produced at by the use of natural gas.

Woodcock's Foundry, Bridgeport, was sold on June 29th, at sheriff's sale, to James Lewis; consideration, \$5667. The foundry will resume at an early day.

A company of Pittsburgh capitalists have leased 2000 acres of land in the vicinity of Youngstown, and are preparing to bore for gas.

The rumors circulated to the effect that the Falcon Iron and Nail Company intend moving their works from Niles to Alliance are entirely without foundation. No proper adjustment has yet been arrived at with the insurance companies.

Hon. H. S. Bundy has sold Latrobe and Keystone Furnaces to a company of Eastern capitalists. The sale is no small importance to our town, as the future will beyond a doubt prove. The lands are located a few miles southwest of Wellston, and comprise tracts aggregating in all about 10,000 acres, and brought \$375,000. Mr. Bundy informs us that it is the intention of the company to at once commence development of the rich mineral deposits which underlie the tracts, and to this end the tracts of different railroads will be extended from here to the most available points on both tracts. The D. & I. tracks which extend to Latrobe will be extended further on to give the company better facilities for shipment, &c. Such a move would greatly add to the various business industries of our town, and bring thousands of dollars directly into our town.—*Wheeling Intelligencer*.

## ILLINOIS.

The Chicago Safe and Lock Company have taken an order from the National Bank of Illinois for burglar-proof safe and vault doors weighing over 16,000 pounds. The safe will be constructed on an entirely new principle, and will be closed and locked without any spindle or arbors passing through the jaws or doors.

The Chicago Retort and Fire-Brick Company's works were destroyed by fire last week. Loss about \$18,000.

An ice machine for the Anglo-American Packing and Provision Company, of Chicago, is being built at the Hercules Iron Works.

## MISSOURI.

With a Clapp-Griffiths steel plant building in Belleville, a rolling mill in process of construction in East St. Louis, and the Vulcan Steel Works about to be opened for operation, it does not look as if St. Louis were going to "get left" as an iron center.

Certainly it would not appear so if we reflect that in addition to all these things a steel plant on Miller street and another in Belleville are among the possibilities—we might say, probabilities.—*Age of Steel*.

## MICHIGAN.

Fire on the afternoon of June 29 destroyed the major portion of the works of the Grand Rapids Mfg. Co., at Grand Rapids. It started from flames caused by the blazing of some varnish into which some hot iron was plunged. The loss is estimated by Mr. D. R. Clay, the chief stockholder, at \$30,000 to \$40,000, largely on material. The works were well insured—mostly in Chicago agencies.

## INDIANA.

The New Albany Rail Mills are very busy on their St. Louis contract to furnish rails and material for the street cable railway. They have added a large extension to their buildings, in which is placed a lot of new machinery, among which is a powerful bending machine and a furnace for heating the heavy irons. The American Foundry, run in connection with the mill, is turning out some heavy cast work for De Pauw's Glass Works. The foundry was recently struck by lightning. A tall brick chimney stack was partly demolished and will have to be torn down, but this will not interrupt work now going on.

The Ohio Falls Iron Works claim to have done a fair average business so far this year, and are satisfied with the outlook for the future. The ruling prices are low, but they have bought material very cheaply. They have been able to maintain their price, which is in advance of other irons. The strike, they state, has not affected them.

## KENTUCKY.

All of the pier work on the new bridge across the Ohio River, called the Sand Island Bridge, connecting Louisville and New Albany, Ind., has been completed, and the superstructure, part of which has arrived from the East, will be begun on in a few days. This bridge is to be for railroad,

street railway and vehicles of all kinds, and will shorten the distance between the two cities considerably.

The Licking Furnace, opposite Cincinnati, was banked up June 26, waiting for the settlement of the strike in the iron mills.

Ashland is the only coke furnace and Hunnewell the only charcoal furnace in the Hanging Rock region of Kentucky.

## VIRGINIA.

The demand for charcoal iron is so small that most of the furnaces in this State now out of blast will not blow this year.

The name of the New River Furnace has been changed to Foster Falls.

## WEST VIRGINIA.

The Irondale Furnace has been banked since June 15.

The coal miners near Wheeling have organized what they term "The Coal Miners' Local Union of Wheeling, W. Va."

The stockholders of the La Belle Glass Works held a meeting Thursday afternoon, at which a proposition was made authorizing the directors to perfect a plan by which the present stock should be reduced from \$100 to \$25 per share. They will then offer for sale 1000 shares at \$25 each, the offer being made to the present stockholders, and if not taken will be open to all comers. This will reduce the capital stock from \$100,000 to \$50,000, and will raise a working capital of \$25,000, which, after the indebtedness of \$16,000 is paid, will leave \$9000 to start the works. They also instructed the directors to take out a charter under the laws of West Virginia, if it would not necessitate the dissolution of the present company.—*Wheeling Intelligencer*.

## HARDWARE.

# Current Hardware Prices, July 8, 1885.

July 9, 1885.

## THE IRON AGE.

29

<b>Lusiro.</b> Four-ounce bottles. . . . .	\$1.75	per doz. \$17.00 net
<b>Mallets.</b> Hickory. . . . .	dis 10&10 <sup>5</sup>	dis 10&10 <sup>5</sup>
Lignumvitae. . . . .	dis 10&10 <sup>5</sup>	dis 10&10 <sup>5</sup>
Penfield Block Co., Lignumvitae and Hickory. . . . .	dis 30 <sup>5</sup>	
<b>Mattocks.</b> Regular list. . . . .	dis 60&10 <sup>5</sup>	dis 10&10 <sup>5</sup>
<b>Mear Cutters.</b> Dixon's (P. S. W.) Nos. 1 2 3 4	dis 14.00	17.00 19.00 30.00-dis 40 <sup>5</sup>
Miles' Challenge. . . . .	Nos. 1 2 3	
Woodruff's (P. S. & W.). . . . .	dis 10&10 <sup>5</sup>	dis 10&10 <sup>5</sup>
Hales'. . . . .	Nos. 11 12 13	
W. doz. \$27.00 33.00 50.00 (dis 60&10 <sup>5</sup> )		
Draw Cut. Nos. 5 6 7 8 9 10 11 12 13 14 15	dis 50 <sup>5</sup>	
American. . . . .	Nos. 1 2 3 4	
Stair Black Walnut. . . . .	dis 10&10 <sup>5</sup>	
Enterprise. . . . .	Nos. 10 12 13 32 42	
Each. . . . .	Nos. 2.50 4.00 6.00 10.00	
Kleser's No. 55. . . . .	dis 10&10 <sup>5</sup>	
Kleser's Monarch. . . . .	dis 4.50	9.00-dis 40 <sup>5</sup>
Kleser's Butcher. . . . .	dis 4.00 each	dis 20 <sup>5</sup>
Silver & Deming. . . . .	dis 25 <sup>5</sup>	
Pennsylvania. . . . .	dis 40&10 <sup>5</sup>	
W. doz. \$24.00 28.00 36.00 28.00		
Beef Shavers' Enterprise Mfg. Co.). . . . .	dis 20&10 <sup>5</sup>	
<b>Mincing Knives.</b> American, per doz. 1 blade, #7; 2 blades, #12; 3 blades, #18. . . . .	dis 10&10 <sup>5</sup>	
Smith's. . . . .	dis 20&10 <sup>5</sup>	
Cowles' Hdw. Co. . . . .	dis 60 <sup>5</sup>	
<b>Molasses Gates.</b> Stebbins' Patterns. . . . .	dis 90 <sup>5</sup>	
Stebbins' Genuine. . . . .	dis 75 <sup>5</sup>	
Stebbins' Timmed Ends. . . . .	dis 40&10 <sup>5</sup>	
Chase's Hard Metal. . . . .	dis 50&10 <sup>5</sup>	
Bush. . . . .	dis 50 <sup>5</sup>	
Lincolns' Patterns. . . . .	dis 70 <sup>5</sup>	
Weed's. . . . .	dis 20&10 <sup>5</sup>	
Boss Nos. 1 2 3 4	dis 7.00 8.00 9.00 10.00	W. doz. dis 60&10 <sup>5</sup>
<b>Money Drawers.</b> Nails. . . . .	See Trade Report	
Wire Nails. . . . .	dis 50 <sup>5</sup>	
Wire Carpet Nails. . . . .	See Tacks	
Nail Puller. . . . .	W. doz. \$9.00 net	
Curtis Hammer. . . . .	W. doz. \$30.00, dis 10 <sup>5</sup>	
Giant, No. 1. . . . .		
<b>Nuts and Washers.</b> In lots less than 100 lbs, W. doz. add 10% to list; 1 lb. each. . . . .		
South. . . . .	W. doz. 10% off list	
Hexagon. . . . .	W. doz. 10% off list	
Washers. . . . .	W. doz. 10% off list	
<b>Nut Crackers.</b> Table (Hummon & Beckley Mfg. Co.). . . . .	dis 40 <sup>5</sup>	
Blake's Pattern. . . . .	W. doz. \$1.00, dis 50 <sup>5</sup>	
Turner & Seymour Mfg. Co. . . . .	dis 50 <sup>5</sup>	
<b>Oakum.</b> Government. . . . .	W. doz. 75 <sup>5</sup>	
U. S. Navy. . . . .	W. doz. 65 <sup>5</sup>	
Navy. . . . .	W. doz. 65 <sup>5</sup>	
<b>Oilers.</b> Zinc and Tin. . . . .	dis 60&10 <sup>5</sup>	
brass and Copper. . . . .	dis 60&10 <sup>5</sup>	
Malleable (Hammer's), No. 1, \$3.60; No. 2, \$4.00; No. 3, \$4.40 W. doz. . . . .	dis 10 <sup>5</sup>	
Malleable Oilers, Hammer's Pattern. . . . .	dis 10&10 <sup>5</sup>	
Prior's Patent or "Paw Paw" Brass. . . . .	dis 10&10 <sup>5</sup>	
Prior's Patent or "Paw Paw" Brass. . . . .	dis 50 <sup>5</sup>	
Olmstead's Tin and Zinc. . . . .	dis 60 <sup>5</sup>	
Olmstead's Brass and Copper. . . . .	dis 50 <sup>5</sup>	
Broughton's Zinc. . . . .	dis 60 <sup>5</sup>	
Broughton's Brass. . . . .	dis 60 <sup>5</sup>	
<b>Packing, Steam.</b> N. Y. H. & L. & Packing Co. . . . .	dis 50 <sup>5</sup>	dis 50 <sup>5</sup>
American Packing. . . . .	dis 50 <sup>5</sup>	dis 50 <sup>5</sup>
Russia Packing. . . . .	dis 50 <sup>5</sup>	dis 50 <sup>5</sup>
Italian Packing. . . . .	dis 50 <sup>5</sup>	dis 50 <sup>5</sup>
Cotton Packing. . . . .	dis 15 <sup>5</sup>	dis 15 <sup>5</sup>
<b>Peach Parers.</b> Rotary Knife. . . . .	W. doz. \$15, dis 10 <sup>5</sup>	
Diamond State. . . . .	W. doz. \$15, dis 10 <sup>5</sup>	
<b>Pencils.</b> Faber's Carpenters' high list, dis 50 <sup>5</sup>	W. doz. \$25 net	
Faber's Round Gilt. . . . .	W. doz. \$25 net	
Dixon's Lead. . . . .	W. doz. \$25 net	
Dixon's Number. . . . .	W. doz. \$25 net	
Dixon's Carpenters' dis 40&10 <sup>5</sup>		
<b>Picks.</b> Railroad, 5 to 6, \$11.00; 6 to 7, \$12. dis 60&10 <sup>5</sup>		
Adze Eye, 5 to 6, \$12.00; 6 to 7, \$13. dis 60&10 <sup>5</sup>		
<b>Picture Nails.</b> Brass Head, Sargent's list. . . . .	dis 50 <sup>5</sup>	dis 50 <sup>5</sup>
Brass Head, T. & S. Mfg. Co. . . . .	dis 50 <sup>5</sup>	dis 50 <sup>5</sup>
Porcelain Head, Judd's list. . . . .	dis 40 <sup>5</sup>	dis 40 <sup>5</sup>
Porcelain Head, T. & S. Mfg. Co. . . . .	dis 40 <sup>5</sup>	dis 40 <sup>5</sup>
<b>Pinking Irons.</b> W. doz. 65 <sup>5</sup>		
<b>Pipes and Nippers.</b> Button's Patent. . . . .	dis 33 <sup>5</sup>	dis 30&10 <sup>5</sup>
Hall's Pat. Company's Lower Cutting Nippers, No. 5. . . . .	dis 50 <sup>5</sup>	dis 50 <sup>5</sup>
5 & 6 in. Nos. 4 & 7 in. \$21.00 W. doz. . . . .	dis 20&10 <sup>5</sup>	
Humason & Beckley Mfg. Co. . . . .	dis 50 <sup>5</sup>	
Gas Pliers. . . . .	dis 60 <sup>5</sup>	
Eureka Pliers and Nippers. . . . .	dis 60 <sup>5</sup>	
Russell's Pliers. . . . .	dis 25 <sup>5</sup>	
P. S. & W. Cast Steel. . . . .	dis 25 <sup>5</sup>	
P. S. & W. Tinner's Cutting Nippers. . . . .	dis 60 <sup>5</sup>	
<b>Plumb and Levels.</b> Standard List. . . . .	dis 70&10 <sup>5</sup>	
Leach's. . . . .	dis 45&10 <sup>5</sup>	
Pocket Level. . . . .	dis 70&10 <sup>5</sup>	
Davis' Inclinometer. . . . .	dis 10&10 <sup>5</sup>	
<b>Pest Hole and Tree Augers and Diggers.</b> Sargent's Post Hole Diggers. . . . .	W. doz. \$30.00, dis 20&10 <sup>5</sup>	
Fletcher Post Hole Augers. . . . .	W. doz. \$30.00, dis 20&10 <sup>5</sup>	
Eureka Diggers. . . . .	W. doz. \$18.00 dis 20 <sup>5</sup>	
Leed's. . . . .	W. doz. \$50.00 dis 10 <sup>5</sup>	
Vaughan's Hollow Tube Post Hole. . . . .	per doz. dis 20 <sup>5</sup>	
Kohl's Little Gopher. . . . .	dis 23 <sup>5</sup>	
Kohler's Hercules. . . . .	W. doz. \$2.00 dis 20 <sup>5</sup>	
Schneider. . . . .	W. doz. \$24 dis 20 <sup>5</sup>	
Ryan's Post Hole Diggers. . . . .	W. doz. \$24 dis 20 <sup>5</sup>	
Crook's Post Bars. . . . .	W. doz. \$72, dis 50 <sup>5</sup>	dis 50 <sup>5</sup>
<b>Potato Parers.</b> White Mountain. . . . .	W. doz. \$5.50	
Antim. Combination. . . . .	W. doz. \$8.00	
Hosier. . . . .	W. doz. \$15.50	
<b>Pruning Hooks and Shears.</b> Distant's Combined Pruning Hook and Saw. . . . .	dis 20&10 <sup>5</sup>	
Distant's Pruning Hook. . . . .	W. doz. \$12.00, dis 40 <sup>5</sup>	
B. S. E. S. Pruning Shears. . . . .	dis 40 <sup>5</sup>	
Pruning Shears. . . . .	W. doz. \$7.50 dis 40 <sup>5</sup>	
Henry's Pruning Shears. . . . .	W. doz. \$10.50 dis 40 <sup>5</sup>	
Wheeler, M. & Co.'s Combination. . . . .	W. doz. \$12, dis 20 <sup>5</sup>	
Dunlap's Saw and Chisel. . . . .	W. doz. \$5.50, dis 30 <sup>5</sup>	
J. Mallinson & Co., A. & B. Co. list. . . . .	dis 30 <sup>5</sup>	
<b>Pulleys.</b> Ho. House, Awning, &c. . . . .	dis 60 <sup>5</sup>	dis 10 <sup>5</sup>
Japanned Screw. . . . .	dis 60 <sup>5</sup>	dis 10 <sup>5</sup>
Brown's. . . . .	dis 60 <sup>5</sup>	dis 10 <sup>5</sup>
Japanned side. . . . .	dis 60 <sup>5</sup>	dis 10 <sup>5</sup>
Japanned Clothes Line. . . . .	dis 60 <sup>5</sup>	dis 10 <sup>5</sup>
<b>Pumps.</b> Cistern, Best Makers. . . . .	dis 50 <sup>5</sup>	
Pitcher Spout, Best Makers. . . . .	dis 50 <sup>5</sup>	
Pitcher Spout, Cheaper Goods. . . . .	dis 70 <sup>5</sup>	
<b>Punches.</b> Saddlers' or Drive, good quality. . . . .	W. doz. \$0.75	
Bemis & Call Co.'s Cast Steel Drive. . . . .	dis 50 <sup>5</sup>	
Bemis & Call Co.'s Springfield Socket. . . . .	dis 50 <sup>5</sup>	
Spring, good quality. . . . .	W. doz. \$1.50	
Spring, each's Patent. . . . .	W. doz. \$1.50	
Bemis & Call Co.'s Spring and Check. . . . .	dis 40 <sup>5</sup>	
Solid Timmers'. . . . .	W. doz. \$1.44, dis 55 <sup>5</sup>	
Timmers' Hollow Punches. . . . .	dis 30 <sup>5</sup>	
<b>Rail.</b> Sliding Door, Wrought Brass. . . . .	W. doz. 20 <sup>5</sup>	
Sliding Door, Bronze. W. R. Iron. . . . .	W. doz. 20 <sup>5</sup>	
Sliding Door, Painted. . . . .	W. doz. 20 <sup>5</sup>	
Sliding Door, Light. . . . .	W. doz. 20 <sup>5</sup>	
Per 100 feet. . . . .	dis 5.00 6.00 6.40-dis 10 <sup>5</sup>	
R. D. for N. H. Hangers. . . . .	Small. Med. Large	
Per 100 feet. . . . .	\$15. 2.70 3.25 net	
Terry's Wrought Iron. 5/8" foot. . . . .	dis 50 <sup>5</sup>	
Victor Track Rail, 7/8" foot. . . . .	dis 50 <sup>5</sup>	
<b>Rakes.</b> Steel. . . . .	dis 60&21 <sup>5</sup>	dis 60&10 <sup>5</sup>
<b>Razors.</b> J. R. Torrey Razor Co. . . . .	dis 20 <sup>5</sup>	
Wostenholme & Butcher. . . . .	W. doz. 10 <sup>5</sup>	
<b>Razor Strips.</b> Genius Emerson. . . . .	dis 60 <sup>5</sup>	
Imitation Emerson. . . . .	W. doz. \$2.00, dis 20 <sup>5</sup>	
Torrey's. . . . .	dis 60 <sup>5</sup>	
Badger's Belt and Combination. . . . .	W. doz. \$2	
<b>Rivets.</b> Iron, regular, in bulk or papers. . . . .	dis 50 <sup>5</sup>	
Iron Block and Carriage. . . . .	dis 50 <sup>5</sup>	
Iron, others. . . . .	dis 40 <sup>5</sup>	
Copper Rivets and Hurts. . . . .	dis 60	dis 60&10 <sup>5</sup>
Nos. 7 8 9 10 11 12 13 14 15	dis 50 <sup>5</sup>	
Nos. 5 6 7 8 9 10 11 12 13 14 15 16	dis 50 <sup>5</sup>	
Nos. 5 6 7 8 9 10 11 12 13 14 15 16 17	dis 50 <sup>5</sup>	
Nos. 5 6 7 8 9 10 11 12 13 14 15 16 17 18	dis 50 <sup>5</sup>	
<b>Rivet Sets.</b> Stair. Stair, Brass. . . . .	dis 25 <sup>5</sup>	
<b>Ropes.</b> American. . . . .	dis 60 <sup>5</sup>	
Spring. . . . .	dis 40 <sup>5</sup>	
Common. . . . .	dis 20 <sup>5</sup>	
Bed. . . . .	dis 35 <sup>5</sup>	
Machine, Flat Head, Iron. . . . .	dis 60 <sup>5</sup>	
Machine, Round		



## The Webber Centrifugal Pump.

The accompanying illustration gives a good idea of the simplicity of a Webber centrifugal pump as recently furnished to a Mexican sugar plantation for irrigating purposes, by Messrs. Westinghouse, Church, Kerr & Co., 17 Cortlandt street, New York. The combination is that of the well-known Westinghouse engine and a Webber centrifugal pump mounted on the same bed-plate, thus securing the most compact arrangement, and one not liable to get out of order. The pump as shown is a No. 14, Class A, having 14-inch delivery-pipes, running at a speed of 300 revolutions per minute, and raising 4000 gallons of water per minute, or 5,760,000 gallons in 24 hours, to a height of 44 feet—quite a high lift for such a large volume of water. Messrs. Webber, of the Lawrence

have them. W. Ritchie;" and D. said that was all right. The order was not shown to D. The bricks were delivered to C. on the order. R. refused to pay D for the bricks, and he then sued the railroad company for their value, alleging a conversion of them by the delivery to the wrong person. In this case—Dobbin vs. Michigan Central Railroad Company—the plaintiff was defeated, and he carried the judgment to the Supreme Court of Michigan, where it was affirmed. Judge Champlin, in the opinion, said: "The plaintiff insists that the order did not justify the delivery of the bricks to C. because on its face it repudiated all claim to them. But the order on its face was sufficient authority for the company to deliver the bricks to C. The statement that he had no claim upon them was not a refusal to receive them, and the direction to let C. have them was a suffi-

sin, where the judgment was affirmed. The chief justice (Cole), in the opinion, said: "A court of equity will correct such a mistake and reform the instrument when the evidence clearly shows what the real agreement was. Indeed, our system of jurisprudence would be sadly defective if it did not afford a way to correct and reform an instrument which, owing to the mistake of the scrivener who undertook to reduce the prior agreement to a written form, failed to express or set forth the terms of the contract which the parties had actually made. Of course a court of equity will not reform an instrument for a mistake or for an omission in reducing the contract to writing, unless the mistake or omission is clearly shown by satisfactory evidence. But if the mistake or omission is shown, it will be corrected."

## Howell's Improved Iron and Steel Wheels.

Mr. G. W. Howell, of Covington, Ky., is now preparing to place on the market a new wheel for all kinds and sizes of wheelbarrows, from the lightest excavation and grading service to the heaviest stone and metal barrows. Also all kinds and sizes of railway, baggage and other trucks. The tire is a plain wrought-iron or steel ring of any desired size and diameter, with countersunk holes for the heads of the spokes. The spokes are enlarged at each end. The outer end fits the hole in the tire; the inner end has, in addition to a head on it, a hook which hooks into a button-hole in the flange on the hub. Then by inserting a tube between the hubs, with light and left threads on the ends, and turning it, the hubs are, by a collar on each end of the tube, forced apart until any desired degree of tension is put upon the spokes, the effect being great rigidity in all parts.

The spokes are made by machinery, and are of uniform length. The tire, being a thin iron or steel ring, is sensitive to strain in all parts, so that simple and perfect adjustment is the result of screwing up the tube and forcing out the hubs. When screwed up, the tire, spokes and hub are as inseparably coupled together as the links of a chain, and it is not possible to separate them without unscrewing the tube. The hub is by this arrangement held exactly in position by a high degree of tension trans-

protoxide of iron (ferric sulphate) being the second. This latter salt may often be observed on the face of coal which has been exposed to the air for a long time, in the form of yellow ochre-like spots which have an inky taste. The first stage of the atmospheric oxidation of iron pyrites (ferric sulphate), generally makes its appearance in the form of colorless fibers protruding here from the face of coal, or if the pyrites be present in lumps it will be coated over with these crystals of sulphate, and, inasmuch as these crystals greatly exceed in volume that of the original pyrites, disintegration of the coal takes place. The heat developed by oxidation is further augmented by the subsequent conversion of the sulphate into hyposulphite, with liberation of sulphuric acid, which, when combined with one-quarter its weight of water, rises to the temperature of 220° F. Ferric sulphate, resulting from the oxidation of ferric sulphate, is asserted to be again reduced to ferric sulphate by contact with coal, and hence may act as a vehicle to convey oxygen to the organic constituents of coal, because it is attended with a considerable development of heat, and by swelling it disintegrates the body of coal and renders it more porous to oxygen; still, the operation is a very slow one, and consequently there is great loss of heat. The author does not wish to imply that if there were a large quantity of iron pyrites present its oxidation would be incapable of setting the coal on fire, but he believes that this substance is of secondary importance, only acting as a carrier of oxygen as a disintegrating agent, and aids by the development of heat. This view is supported by the fact that it is in seams most free from pyrites that these fires occur—for instance, the thick coal of South Staffordshire, the main coal of Leicestershire and the pure coals of Silesia.

*Oxidation of the Organic Constituents.*—So long ago as 1862 an opinion was expressed by Dr. Percy that some other substance than iron pyrites was mainly answerable as the active agent in the spontaneous combustion of coal, and he further stated that it would probably be similar to that which determines the spontaneous ignition of cotton waste, viz., the absorption of oxygen. It was, however, left to Richters to investigate this action, and from his papers in *Dingler's Polytechnisches Journal* for 1870, exxv., 315 and 419, and exxvi., 317, the following information is given:



HOWELL'S IMPROVED IRON AND STEEL WHEELS.

mittened through the spokes from tire to hub. The hub is of malleable iron, and steel bushed.

## The Spontaneous Combustion of Coal.

Although it refers specially to the origin of that dread calamity, underground fires in collieries, there is much of general interest in a paper on the spontaneous combus-

tion was extracted by Dr. Percy, and is now reproduced here on account of its interest in a scientific, and of much importance in a practical, point of view. When coal is kept at ordinary temperatures in contact with oxygen, either pure or mixed with nitrogen, as it exists in atmospheric air, it absorbs that gas, of which one portion combines with carbon and hydrogen, forming carbonic acid and water respectively, while another enters into an unknown state of combination with the coal and proportionally increases its weight. Richters ascertained that 20 grains of powdered coal, freed from dust by means of a sieve, absorbed from 2 to 9 c. cm. of oxygen in 24 hours, and that, although this action takes place more rapidly at first and gradually decreases, it never entirely ceases; from this it follows that freshly-got coal will absorb more oxygen than that which has been gotten some time. This action of oxygen on coal is much promoted by heat, even if the temperature does not exceed 170° to 195° F. We are thus able to understand the part played by iron pyrites, viz., it first disintegrates the coal, rendering it more permeable to the oxygen of the air, and while this is going on it heats the particles and renders them more susceptible to the process of oxidation.

Richters also experimented with the object of ascertaining whether there was any connection between the power of coal to absorb oxygen and its power to absorb moisture from the atmosphere, and he found that the quantity of oxygen absorbed by different coals under the same conditions is proportional to the quantity of moisture they absorb. It is regarded as more than possible that absorption of oxygen, like moisture, is purely physical in the first stages, and that in the latter ones the condensation of the gas precedes its combination with the substance of the coal. The other results obtained by Richters may be summarized thus: Sunlight lessens or retards the absorption of oxygen by coal; moisture generally impedes rather than promotes the oxidation of the organic constituents, the opposite being the case with iron pyrites; coal poor in sulphur absorbs less oxygen in the moist than in the air-dried state, while coal rich in sulphur absorbs less in the air-dried than in the moist state.

Spontaneous combustion takes place, as has been repeatedly proved, in coals which are quite free from iron pyrites; not only so, but it occurs more especially in coals which are remarkably free from iron pyrites. All coals can be divided into certain classes, which vary by imperceptible degrees, forming, first, the class called lignite; second, the free-burning coals, of which the South Staffordshire are a type; third, the coking coals, and, finally, anthracite. The various changes producing these different types have taken place by the elimination of their gaseous elements. As we start at lignite

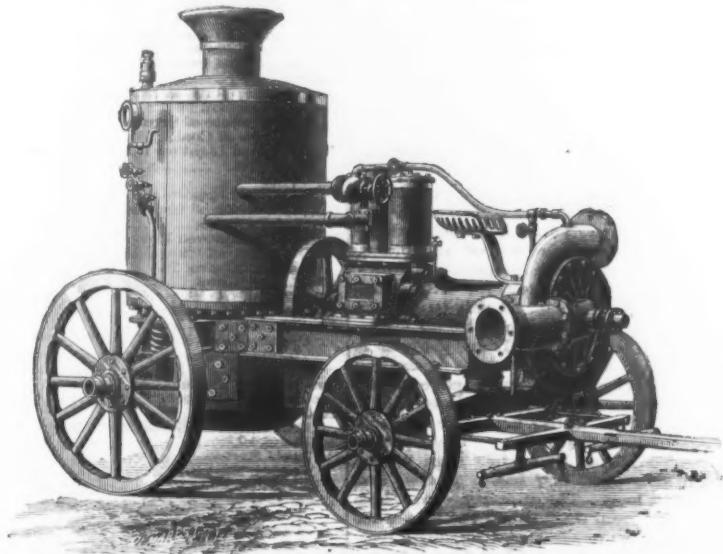
action may be greatly accelerated by either of the other two operating at the same time.

A financial project which meets with much favor in Mexico, as we learn from a Washington report, is the sale to the United States of the six States of Mexico which lie on her northern boundary—Tamaulipas, Nuevo Leon, Coahuila, Chihuahua, Sonora and Lower California. Sonora and Chihuahua have recently been opened up by American lines of railroad. They are both exceedingly rich States. The area embraced in this proposition is about 330,000 square miles. Texas contains only 237,231 and California only 188,982, while New York and Pennsylvania, the largest of the older States of the East, have only 46,000 square miles each. Of all these States, Sonora is probably the wealthiest. Her annual production of gold and silver is now about \$4,000,000. The value of the territory thus sketched, when put into figures, is variously stated at from \$100,000,000 to \$300,000,000. A second scheme provides for the sale of Sonora, Sinaloa and Lower California only.

The Secretary of the Treasury on Tuesday decided a contract case involving an important labor question. Bids were recently opened for stonework on the post office at Peoria, Ill. Messrs. Brainerd & Co., of Joliet, were the lowest bidders. A protest against their being awarded the contract was, however, filed by Messrs. Staub & Co., of Buffalo, the next lowest bidders, on the ground that Brainerd & Co. are contractors for the labor of the Illinois State Prison and would employ convict labor on the post office. The matter was referred to the Solicitor McCue, who gave an opinion that the department should not be expected to dictate the means by which contractors perform their work, and that he did not believe the protest a valid one. Secretary Manning has sustained the solicitor, and the contract will be awarded to Brainerd & Co.

A monster cylinder carrying a coil of cable for the grip line of street cars was rolled over the macadam pavements in St. Louis last week, crushing deep gullies all along its route. The coil was about 12 feet wide, 2 feet in diameter, with 34,400 feet of cable on it, and weighed 80,510 pounds. A coil was shipped from that city to Chicago lately, containing 9½ miles of cable, which weighed 100,000 pounds.

A nautical schoolship, modeled after the schoolship in New York for the education of boys in seamanship, is about to be established in Philadelphia. The Government will furnish the vessel with all necessary equipments and give the officers two-thirds of the regular pay for sea service.



THE WEBBER CENTRIFUGAL PUMP FOR IRRIGATING PURPOSES.

Machine Shop, make three classes of pumps for high, medium and low lifts, lettered A, B and C, respectively. In rating the capacity of their pumps they state the quantity that can be discharged by any given size of pump with reasonable economy of power. The Lawrence Machine Shops propose in all cases to furnish pumps large enough to lift the required amount of water at a velocity not exceeding 10 feet per second, and only guarantee their efficiency on that basis; but in cases where economy of power is no object a much larger quantity of water can be thrown than that given for the economical rating of the pump. The Lawrence Machine Shops have inaugurated a system of testing all their several sizes of pumps by measuring the power taken to drive a pump, and measuring the water discharged per minute at different levels. They make several styles of pumps designed for factories and paper-mill supply purposes and for contractors' use. They are bringing out a portable pumping engine for city use on sewer work and as an adjunct to fire departments for pumping out flooded cellars, &c., and for irrigating detached fields and garden plots where it would be impracticable to run ditches or canals.

## Steel Post-Hole Digger.

While a similar article has long been in use as made by the blacksmiths, it has recently become an article of merchandise, being now manufactured by Oliver Brothers & Phillips, Pittsburgh, Pa., as represented in the accompanying illustration. Beyond the fact that it is made of solid steel, is 5 feet 7 inches in length and weighs 17 pounds, no description is required. Its utility will generally be understood, and the special

quantity of goods in one lot or parcel is, I think, 100.

point made in favor of its use is the materially reduced price at which it can now be purchased.

## LATEST LEGAL DECISIONS.

## SALE—ARTICLE TO BE MANUFACTURED—LIABILITY OF PURCHASER.

Mrs. S. made a contract with M. for a monument to her husband, in which it was stated: "I have this day bought, &c., a monument, &c., for which I promise to pay \$700, one year from date." She concluded, after the monument was completed, except as to the inscription, that the purchase was an unwise act, and refused to take it, and insisted that she was not liable for the price. In an action brought to recover the agreed price—McAllister vs. Safeley—the plaintiff had judgment, and defendant appealed to the Supreme Court of Iowa, where she was again defeated. Judge Reed, in the opinion, said: "There was no right to rescind reserved by either party, and the law will not permit one party to an agreement to terminate it at his pleasure unless the right to do so is reserved in the contract itself. The true rule in the cases of executory contracts for the purchase of personal property is 'that when everything has been done by the vendor which he is required by his contract to do, and the manufactured property in its completed condition is tendered to the purchaser, the vendor may recover the contract price.'"

SALE—ACCEPTANCE—DELIVERY BY CARRIER. D. consigned three car-loads of bricks to R. at Kalamazoo, from Williams' Station on the line of the Michigan Central Railroad. R. refused to take the bricks, and the station agent wrote to D., advising him, and asking him for instructions as to the disposal of the bricks. D. came to Kalamazoo, and was informed that R. had sent to the company this order: "M. C. Railroad: I have no claim on those bricks you have at the station from Williams' Crossing. You can let Mr. Cash

upon the face of it, fraudulent and void. This is not the law. Such a sale may be evidence of fraud, but is not in itself fraudulent. The law presumes that a public sale is made in good faith. Within certain limits the officer must exercise his own judgment. He is not bound in all cases to sell by the single article. He may, and often should, sell in lots or parcels. In this case the goods were sold in two lots; in one was the machinery of the establishment and in the other a quantity of shawls, some in cases, and others sample lots on the counters. Should these goods, the product of a large manufacturing establishment, and in a commercial city, have been sold by the piece, auctioneered off, day by day, to the rabble which might happen to drop in? Certainly not; for no better way could have been devised for the sacrifice of this property. That is certainly not the way in which similar transactions are conducted in the wholesale trade, and why should a sheriff or other officer adopt a different rule? He must sell in lots or parcels, and, if so, who is to be the judge of the size and value of the lots? We see nothing here to indicate a fraudulent sale. The evidence might mislead the jury, that is all, and it should not have been submitted to them. They should have been charged to find for defendant."

LEASE—SCRIVENER'S ERROR—REFORMING THE INSTRUMENT.

S. rented from R. a house, and it was agreed, as an inducement to S. to make a new lease, that certain repairs and improvements were to be made by the landlord. The lease was drawn up by the husband of R., with the consent of S., and he failed, by reason of a lack of necessary education, to embody the terms and stipulations as to repairs. S. signed the lease under the supposition that it was correct. He sued to have the lease reformed to express the intentions of R. and himself, and the decision was in his favor. The defendant carried the case—Silbar vs. Ryder—to the Supreme of Wisconsin.

## Turret-Head Chucking Lathe.

Our annexed cut illustrates a turret-head chucking lathe made by the Bridgeport Machine Tool Works, Bridgeport, Conn., of which Mr. E. P. Bullard, 14 Dey street, New York, is proprietor. This machine is designed to take the place of hand lathes and old-style chucking machines where holes are to be drilled or bored and tapped in all kinds of work. It is also adapted for making screws, stud-bolts for engine and other work of similar nature, the spindle being made in this case with a hole about 1 1/2 inches in diameter. The swing is 20 inches over the bed. The latter is 5 feet long, and can be made longer if desired. The cone has four changes of speed for a 3-inch belt, the largest step being 1 1/4 inches in diameter. The machine is also made with back gear if desired. The spindle is of forged steel and the front bearing on headstock is 2 1/2 inches in diameter and 4 1/2 inches long. The turret-head is self-revolving, is 9 1/2 inches in

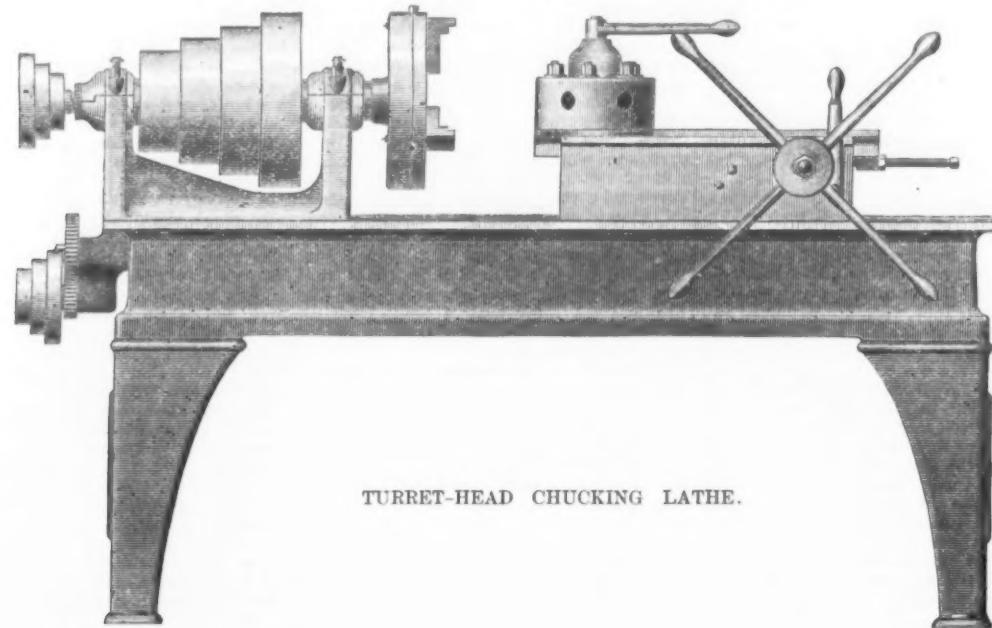
## The Manufacture of Slag Brick.

Dr. E. D. Peters, Jr., in a series of papers contributed to the *Engineering and Mining Journal* on the copper-smelting processes, gives the following account of the manufacture of slag brick:

These are generally made from the slag of reverberatory smelting furnaces, both because this material is usually more siliceous than any other, and also because, during the process of skimming, it can be obtained in large quantities in a very brief space of time. There should be no difficulty, however, in making the brick from the slag of a blast furnace, provided the smelting is sufficiently rapid to fill the molds properly, and that it is not so basic as to yield too fragile a material on cooling. Even with exceedingly brittle blocks produced from a highly ferruginous ore, excellent and durable walls can be constructed, provided the blocks are placed in position uninjured; for they will bear an

summit, while the double row of molds slopes away from it in each direction laterally. After the wooden blocks have been placed on this sloping bed in a proper horizontal position, and exactly equidistant from each other, as determined by a wooden gauge, the remaining sand, very slightly but equally dampened, is shoveled back again and carefully trodden and tamped evenly into all the interspaces and around the outside edges of the blocks until it reaches the level of their upper surface. This is a very brief operation, for it is not essential to tamp the sand very firmly, so long as about an equal degree of solidity is imparted to all portions of it. A cylinder of hard-wood—3 inches in diameter and 4 inches long—which, when placed lengthwise, fits exactly between each two molds, is laid upon its side, and by a few blows of the mallet driven into the sand, thus when removed forming a little gutter through the middle of the partition wall and connecting each pair of adjacent cavities in such a manner that

but by simply changing the form of the pattern they may be produced of any desired shape or size, although experience has shown that it is not economy to attempt the manufacture of very thin slabs, or of any weight below 45 pounds. The immense value of this building material, produced from an otherwise worthless material, and obtainable in rectangular shape for plain walls and foundations, in wedge shape for arches and for forming a circle in walling wells, and for many other daily needs, can be fully appreciated only by those who have had occasion to build in a country where rock was unobtainable and brick poor and expensive. A particular distinction should be made between the old plan of making slabs of slag in iron molds, as practiced all over the world, and this method of sand molding, for which the profession is indebted to Mr. J. E. Gaylord, secretary of the Parrot Silver and Copper Company, Butte, Mont.



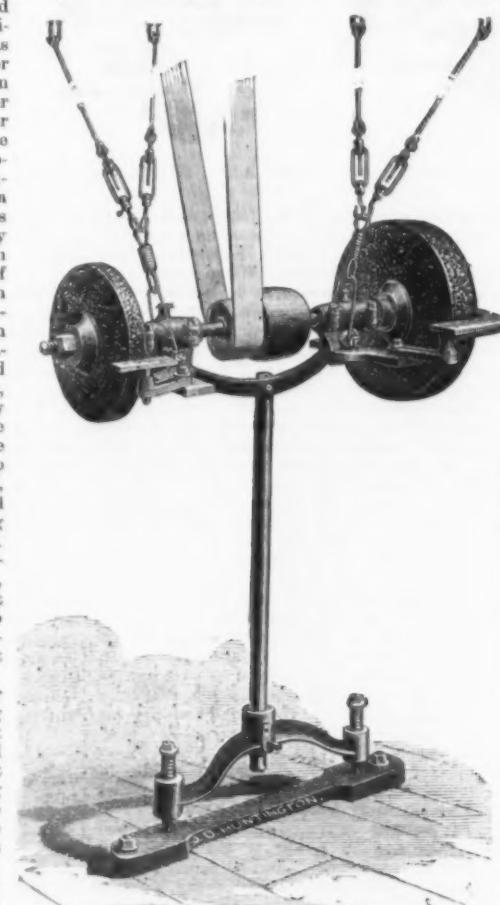
TURRET-HEAD CHUCKING LATHE.

diameter and has six holes 1 1/2 inches in diameter. The movement of the turret slide is 12 inches, and the automatic feed operating it has a stop motion to throw it out at the proper time. The machine is also made with a gap bed, so as to swing 32 inches.

## New Device for Suspending Emery Wheels.

The accompanying engraving shows the form and construction of a new grinding and polishing machine brought out by the Diamond Emery Wheel and Machine Company, of Providence, R. I. The machine, as shown, is hung in cushions or springs, and suspended between ceiling and floor by wires or spring-rods in such a manner that the emery-wheels revolve on their centers of gravity, doing away with all noise or unpleasant vibrations, so that a solid wheel under the work feels soft as a cushion, and does away with the wavy appearance on surface work. A great part of the polishing or cutting down heretofore done on leather-covered wheels can be done on solid wheels. With the new machines emery-wheels are claimed to last longer and cut much faster, because the work passes smoothly over the wheel, every particle of emery doing its share of the work. The work does not bump and stutter over the wheel, crushing the grains of emery and tearing them out without allowing them to cut, as on other machines. The new machine has no cumbersome frame or base in the way, and allows the workman to get at all parts of the wheels and to grind all heavy work on a barrow under the wheel, so that he can see what he is doing.

Various styles of machines for all kinds of grinding, polishing and buffing are kept in stock or made to order. For solid wheels machines will have rest brackets, front and rear. Buffing and polishing machines will have no rest brackets, but will be made in the most convenient form for all kinds of polishing, including a special line of heavy plow-polishing machines. The machines are of the very best workmanship; the spindles and connecting parts and suspending wires or rods are steel; they have long spindles with long dust-proof bearings. They will be furnished with solid-iron or Babbitt bearings, as desired.



Huntington's Device for Suspending Emery-Wheels.

should be formed by means of a number of wooden blocks of the required size, carefully smoothed and slightly tapered to facilitate their removal from the sand, and furnished with a 30-inch handle inserted in their upper surface. These slag blocks are molded on the flat, in the same manner as ordinary red brick, and, after leveling off the pile of dampened sand to form a smooth and horizontal bed, the wooden blocks—some 12 in number on each side of the skimming door—are arranged in a double row, 4 inches apart between blocks, and the same distance between the two parallel rows. Besides the ordinary deep excavation for the plate slag, a second bed should be left on each side, between the former and the first brick mold right and left, both for the purpose of settling any grains of metal that may be accidentally drawn over during the process of skimming, and to act as a regulating reservoir to lessen the sudden impulse of the waves of slag that follow each motion of the rabble, and thus to prevent the destruction of the very fragile sand molds. The entire bed is constructed on an inclination of about 1/8 inch to the foot, the plate slag forming the

immense crushing weight with impunity, and seem to defy the action of the elements. Assuming the slag to be obtained from a reverberatory furnace, the process of preparing the molds should be begun as soon as possible after the slabs from the previous skimming have been removed and all chips and fragments cleared from the sand-bed by the aid of a close-toothed iron garden rake. Ordinary loam—or a natural mixture of fine sand and clay of such consistency that, when slightly moistened, it will ball firmly in the hand—is the proper material for the molds, which

the flow of slag through either lateral system meets with no impediment. The wooden blocks are then removed from their sand bed with the greatest care, it often being necessary to loosen them by gentle tapping and other means familiar to the experienced molder. The bell requires only a few hours' drying to fit it for the slag.

By the time the charge is ready for skimming, say in three hours or less after the completion of the bed just described, it should be in proper condition, and the furnace helper, armed with a small rabbled-shaped hoe, stands beside the skimmer ready to turn the stream of slag into the proper molds, remove obstructions from the gutters, break through the rapidly-forming crust if indications of chilling appear on the surface of the molten bath, and see in general

that the charge is properly distributed. The wooden blocks are then removed from their sand bed with the greatest care, it often being necessary to loosen them by gentle tapping and other means familiar to the experienced molder. The bell requires only a few hours' drying to fit it for the slag.

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that the charge is properly distributed.

The mooring arrangement must necessarily be an important feature in any scheme of this kind, and to this special attention has been paid. A massive framework of

## CONTENTS.

	PAGE.
The Station "B" Chimney of the New York Steam Company. Illustrated	1
Seamless Copper Tubes	1
Steel for Boilers	1
The "Crinoline" Chimneys of the Cambria Iron Company	5
A New Form of Railroad Competition	7
New Publications:	
Friction and Lost Work in Machinery	7
The Mechanics of Materials	7
Pocket-Book of Mechanics and Engineering	7
Trade Publications:	
Aluminum and Its Alloys	9
Fire-Engines	9
Boilers	9
Steam Pumping Machinery	9
Coal-Handling Machinery	9
General Machinery	9
Punches, Shears and Boiler Rolls	9
Sawmill Machinery	9
Engines and Threshers	9
The Philadelphia Mechanics' Home	9
Antislavery Production	11
English Letter	11
Steel Castings for Locomotive Work	13
Fast Railroad Trains	13
The Manufacture of Screws in Rhode Island	15
Preservation of Coal	15
The Action of Light on the Electric Resistance of Selenium	15
Editorial:	
New York Imports of Iron and Steel	16
The Position of Wire Rods	16
New Processes	16
Cuba's Impressed Prospects	16
Condition of the Blast Furnaces of the United States, July 1, 1885	16
Washington News	16
Condition of the Blast Furnaces of the United States, July 1, 1885	17
Scientific and Technical:	
Painting Ironwork	17
The Mechanical Properties of Zinc	17
The Geology of Natural Gas	17
The Crinoline Incandescent Lamp	19
The Iron Age Directory	19
Trade Report:	
British Iron and Metal Markets	21
Financial	21
Metal Market	21
Foreign Markets	21
A New Guide and Bar Mill	21
Trade Report:	
New York Iron Market	22
Iron Exchange	22
Philadelphia	22
Pittsburgh	22
Chicago	22
Chattanooga	22
St. Louis	22
Louisville	22
Detroit	22
Imports and Exports	22
Coal Market	22
General Hardware	24
The American Cable Road	25
Metallurgical Notes:	
Some Experiments on the Power Required to Roll Rails and Tires	25
Plants and Processes	25
The British Amalgamated Society of Engineers	25
Industrial Items	27
The Cross Divided Pulley	27
Steel and Iron Axles	27
Current Hardware Prices	29
Wholesale Metal Prices	29
The Rubber Centrifugal Pump	31
Steel Post-Hole Digger	31
Latest Legal Decisions	31
Howell's Improved Iron and Steel Wheels	31
Illustrated	31
The Spontaneous Combustion of Coal	31
Turret-Head Chucking Lathe	32
New Device for Suspending Emery-Wheels	32
Illustrated	32
Floating Breakwaters	32
Experiments with Bolts and Screw Threads	33
Illustrated	33
Steel in Structural Work	35
Driving Stone Headings Without Explosives	35
A Novel Method for Cutting Glass Tubes	35
Philadelphia and Pittsburgh Hardware and Metal Prices	43
Boston Hardware and Metal Prices	44

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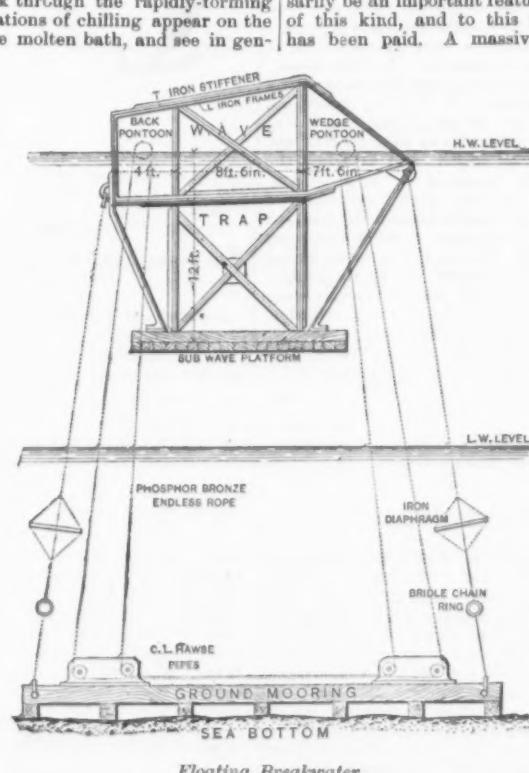


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Floating Breakwater.

eral that the process of filling the molds proceeds in a proper manner. As soon as this operation is concluded a few shovelfuls of sand should be thrown over the surface of the slabs to prevent sudden and unequal chilling. By the time the new charge is in the furnace and the assistant is at liberty to attend to his bricks they will usually be found ready for removal, though still at a red heat on the surface and in most cases quite liquid in the interior. It is essential that they be removed, and the slight roughness that arises from the broken ends corresponding to the gutters through which they were filled be trimmed off with a small cutting hammer while they are still quite hot, as it is just at this stage that they possess the highest degree of toughness, and permit of manipulations that, if they were cool, would inevitably break them into fragments. These slabs are best removed from the furnace by being loaded upon the low iron barrow commonly used for the transportation of pigs of slag and matte. The loading is effected by means of a long 3/4-inch iron rod bent into a hook at one end, and the blocks are then wheeled out upon the dump, where a special workman trims them properly, rejecting all that are imperfect or already cracked, and, when cool, piles them into rows, to remain until needed. The most useful size for general purposes has been found to be about 8 x 10 x 20 inches, and weighing about 85 pounds, timber strongly bolted together is to be sunk in position by means of old rails in this particular instance, although stones, concrete or other substances could be used. On this frame heavy castings will be bolted, round which will pass an endless phosphor-bronze wire rope in two bights, the upper parts being rove over two sheaves placed just above the water line on the pontoons. By this arrangement an opportunity will be given of overhauling the mooring rope and repairing any part if necessary. This will form the main holding power, but there will also be supplementary guys and mooring chains. The engineers connected with this scheme do well to pay particular attention to their ground tackle, as it must be the most important feature in the whole design. Some years ago a floating breakwater of somewhat primitive design was moored off Brighton, and answered very well so long as it remained at its post. One day, however, when it was especially wanted to keep the sea, it came ashore with disastrous results. In this case, however, the sea were stopped merely by opposing a great floating bulk to their impact, and the strain on the mooring chains must have been enormous from the violent blows of the waves. With the arrangement we have described there is no doubt but that the subwave platform would act very beneficially in preventing a sudden strain from being brought on the mooring ropes or chains.

## THE WEEK.

The coastwise transportation lines running South do not find business very profitable of late, but are confidently looking for an improvement after August 1, when the fall trade usually begins, and by September 1 the dry goods shippers will make their appearance in force.

The estate left by the late President Garrett, of the Baltimore and Ohio Railroad, foots up about \$15,000,000.

The strawboard makers of the United States have formed a combination representing a product of more than \$4,000,000 annually, and have decided to raise the price of strawboard \$10 per ton.

A large silk mill is about to be erected in Allentown, Pa., by John Ryle, of Patterson, to be ready for business January 1st.

Despite the stagnation in ocean commerce the North-German Lloyds contemplate important additions to their fleet plying between Bremen and New York. Their agents in this city report that the company have obtained a loan of 10,000,000 marks with which to build three steamers of high speed, which are already under contract. Seven other new ships will be built for the Mediterranean and Australian and Asian services.

Trade relations between Canada and Newfoundland have at last reached a crisis, the latter having advanced the already imposed duties against Canadian flour 80 cents to \$1 per barrel over the former duties, and \$2 per barrel on pork, thus practically prohibiting Canadian and discriminating in favor of United States importations. The difficulty comes about in this wise: The treaty by which American fish was admitted free into Canada having expired, the Dominion Government now imposes a duty on all fish coming into the country, from whatever source. The Newfoundland Government stated that if this was carried out it would impose a heavy duty on Canadian products entering that colony, which in value last year amounted to \$2,187,000, while the total imports from that island into Canada only reached \$705,000, of which \$743,000 came in free of duty.

Our trade with Venezuela steadily grows. The Red "D" Line now comprises six steamers, three having just been started in addition to those previously running. The Venezuelan consul in New York regards this as significant, and remarks that "when more carrying facilities are called into requisition, and comparatively unknown ports are reached direct by American steamers with full cargoes, then I suppose we may at least congratulate ourselves that we can profitably send merchandise to Southern countries in American bottoms." The Ciudad Bolivar Line also dispatched a steamer a few days ago, this being the first of another fleet intended to run in this particular trade. Ciudad Bolivar is the capital of the State of Bolivar, on the right bank of the Orinoco River. Its custom house receives all the gold produced from the mines of Guayana and the productions of the Territories of Amazonas, Gaura and Yuruari, as well as those of the States of Zamora and Bolivar. The commerce of the Orinoco in 1883 was as follows: Imports, kg., 7,409,507.25; bolivars, 12,166,805.83. Exports, kg., 1,289,800; bolivars, 17,144,409. Carupano does a business through its custom house of over 4,000,000 bolivars.

The South American commissioners report to the Department of State respecting their reception in Chili. They found President Santa Maria indifferent to the proposed renewal of the old treaty; nor was he disposed to enter into any further conventions with foreign countries. Guano exports were already in the hands of a company with whom the United States could deal if so disposed. The Government of Chili would favor the adoption of a common silver coin of the value of the United States gold dollar, to be coined by each of the American Republics, of an equal degree of fineness and to an amount which should be agreed, to be legal tender in all commercial transactions between citizens of this hemisphere. This proposition, which has already been assented to by Mexico, Venezuela, Guatemala, Costa Rica, Ecuador and Peru, was accepted by President Santa Maria as a long step toward the monetization of silver, and if adopted by the American Republics might, in his opinion, compel the Latin Union to accept a double standard, and increase the value of one of the chief products of Chili.

The Cable Railway Commission, which has been taking evidence in this city since February 9, meanwhile listening to more than 200 arguments, adjourned *sine die* on Thursday last. As the commissioners propose to make a trip to Chicago and Philadelphia to examine the cable system in operation, it will be several weeks, if not months, before a report can be made to the Supreme Court.

Orders have just been issued at Paterson, N. J., for the closing of the extensive Cooke Locomotive Works there. This leaves running only one of three large works in Paterson, with about 400 men, whereas three years ago 2000 were employed.

The Baltimore and Ohio Telegraph Company have signed a contract with the Averell Insulating Conduit Company for placing their wires underground, beginning with the city of Washington, D. C. The Western Union

Company, it is understood, do not see their way clear as yet toward a practical compliance with the law. The New York commissioners appointed to see that the law is executed within the prescribed time are Jacob Hess, Chas. E. Loew and Theodore Moss.

A well-known nurseryman of Ohio has been authorized by the Commissioner of Agriculture to procure in Russia such seeds of timber trees, hardy ornamental trees, plants and fruit trees as, in his opinion, may be acclimated and made to thrive in the exposed regions of our Northwestern States and Territories.

All the window glass factories in the Pittsburgh region have closed down, as usual, until September 1, after an extremely unprofitable season.

Southern capitalists representing railroad interests have contracted with William Cramp & Sons, Philadelphia, for the construction of an iron steamship for service between Tampa, Key West, Fla., and Havana, Cuba. The new craft is designed to make fast time in carrying the United States mails to Cuba in connection with the Southern railroad system, instead of by Ward's Line of steamships from New York.

The new ironclad Morisini is the fifth of the Italian ironclad frigates; her dimensions are 330 feet in length by 128 feet breadth of beam, being about 7 feet less in length than the Duilio, but 7 feet broader. The Morisini's draft of water will be 24 feet, and her armament similar to that of the Italia.

French exports and imports for the past five months, as compared with those for the corresponding period of last year, are as follows:

	1885.	1884.
January	5,191	8,088
February	8,517	12,551
March	20,192	28,961
April	88,350	47,491
May	56,780	56,503
June	35,328	38,577
Total	164,358	192,171

Judge Sepulveda, of the City of Mexico, who is now in New York City, expresses confidence that President Diaz will be justified before the world in the course he has recently taken for the relief of the public treasury. He came into power six months ago. Meanwhile he has spared no means or labor in his endeavor to bring the country to its proper position. Claims upon the custom houses and revenues held by creditors, many of whom had flourished by the extravagance of the former Administration, payments of interest on national debt and subsidies and the necessary expenses of the Government compelled the President to issue a decree designed to relieve the encumbered revenues, thus placing the country on a solid financial basis. With the revenues and resources of the country wisely husbanded, trammels to traffic removed and confidence restored, we are told that President Diaz will soon find a complete justification for his vigorous action in the results it will produce.

The total receipts of the Philadelphia custom house during the year ending June 30 were \$12,491,524, which is a falling off of nearly \$500,000 compared with the previous year. The cost of collecting was \$3.50 per \$100. New York collects \$135,000,000 per annum at a cost of \$2 per \$100; Boston, \$22,000,000 at a cost of \$3; Baltimore, \$2,500,000, costing \$12; Chicago, \$4,000,000, at \$3.80; New Orleans, \$2,000,000, at \$11; San Francisco, \$7,000,000, at \$5.80.

The general agency of the Red Star and Inman steamship lines in this port has been formally assumed by Peter Wright & Sons, which materially reduces the costs.

The British cotton industry, according to a statement submitted to Parliament, shows that the number of spindles employed in the cotton trade is 42,000,000; of looms, 570,000. The capital invested is from £100,000,000 to £105,000,000; the consumption of cotton is 3,500,000 bales annually, of the value of £40,000,000, and the value of cotton fabric produced is £75,000,000 to £80,000,000 a year.

The New York Mercantile Exchange have effected an arrangement with the railway lines by which perishable commodities arriving in this city on Saturday afternoon will remain in the refrigerator cars for delivery on Monday. This action disposes of a serious obstacle to the early-closing movement in certain branches of business.

According to latest accounts, the Trans-Caspian Railway is nearing its main intermediary point, Merv, and simultaneously the bridging of the River Murghab, on the confines of Afghanistan, is being accomplished, indicating a dogged persistence on the part of Russia in the execution of her great Central Asian scheme.

The Fall River cotton mills have resumed, after 11 weeks' suspension.

The International Industrial and Commercial Congress will be opened on the 16th of August at Brussels, where technical questions and those relating to work and to industrial property will be discussed. The Congress will then be transferred to Antwerp for the consideration of economical, commercial and geographical subjects.

A Western paper says there is a largely increased demand for the gum of the eucalyptus tree, on account of its effect in removing scales in steam boilers and in preventing rust and "pitting." Extensive eucalyptus forests are to be planted in California with the object of supplying the demand.

The success of the last Canadian loan in England, amounting to \$20,000,000, at an average of 101, excites a jubilant feeling in the Dominion. The Montreal *Herald* says: "All that the enemies of the Canadian Pacific could say to the prejudice of that enterprise has been uttered. Parliament has just authorized another loan to the Canadian Pacific and has given the financial world one more assurance of its unalterable determination to stand by the work, and the road itself is on the eve of completion. Yet with all these facts in full view, monetary circles

in England come forward and thrust upon the Canadian Government \$60,000,000 where only \$20,000,000 was asked! The truth is that, instead of the Canadian Pacific Railway proving an injury to the Government credit, it is far more likely to enhance the public credit by fixing the attention of capitalists on the immense resources of the country, the vastness of its undertakings and the enlightened courage and boldness of its policy in encouraging enterprises calculated to promote the country's development for all time."

According to the *Railway Age*, railroad construction during the past six months has been less than for the corresponding period for the past five years. The total miles laid up to July 1 in 25 States is 895.5 by 56 different lines. The States showing an addition of 50 miles or more are Georgia, Florida, Kansas, Missouri, Minnesota, Nebraska and Texas, and in these States, as well as in California and Pennsylvania, from four to six lines each have been under construction.

The total number of immigrants who arrived at this port for the six months ending 30th ult. were 164,358, against 192,171 for the corresponding period of last year. The following shows the comparison by months.

	1885.	1884.
January	5,191	8,088
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The American Standard Ordnance Company have just been incorporated under the laws of this State, with a nominal capital of \$1,000,000. The parties named are: Andrew Wesley Kent, William G. Mitchell, George W. Palmer, George Steel, Louis Rosenfeld and Henry Rosener.

Peru is described as in a most forlorn condition, with trade gone and farms untilled. Our commerce with that country has dwindled down to almost nothing in comparison with its former magnitude. This is accounted for, as remarked by one of the United States commissioners recently in Lima, by the enormous decrease in the purchasing power of Peru, and by the fact that the steamship company, which enjoys a monopoly on the west coast of South America, uses its influence and regulates its freight tariffs so as to direct trade to England. It is the opinion of every merchant in Peru and of the members of the Government, so says the commissioner, that these conditions cannot be changed until there is direct communication by steam between the ports of Peru and those of the United States. It is said to be cheaper to ship goods from New York by way of Liverpool and Hamburg, around the Horn to Callao, than by way of the Isthmus, while the passenger pays \$375. American gold, for transportation from New York to Valparaiso.

The idea of resorting to barbed wire as a military appliance is suggested to a contemporary by the recent seige of Cartagena, in South America, where the assaulting party became entangled in a barbed-wire fence and were as badly mangled by the barbs as by the defenders of the town. It is hardly necessary to observe, says the writer, in a strain which might be mistaken for that of a man in earnest, that had this occurred a quarter of a century ago, the North American military mind would have grasped the same, and probably "Stonewall" Jackson would be in history to-day "Barbed-wire" Jackson. But there was no barbed wire in those days; hence the defenses were usually strengthened by abatis; the bivouac by the hastily dug rifle-pit, and cavalry was defeated by fellings of timber. How much better this can be accomplished, now that a Spanish American in the outskirts of Cartagena was so enterprising as to erect a barbed-wire fence, must be apparent to the mind of the rawest recruit in the militia; and the effect on the wire factories of a general demand for barbed wire as a war supply is, of course, clear to the keen heads of the men engaged in that industry. Reels of wire would be easy to transport, and could be unwound and staked in all sorts of necessary places with the greatest facility.

The United States consul at Callao has reported to the Department of State the adoption of a decree by the Peruvian Government on the 3d ult., by virtue of which every package of merchandise landed in

Peru from abroad must be marked clearly on the outside with its gross weight in kilograms, and this weight must correspond with the specifications of the manifest. The order goes into effect six months from the date thereof, so that all packages arriving after December 3 next will be subject to the conditions imposed. In case of discovery of false weights, double duty will be collected and a fine of from 20 cents to 10 soles silver will be laid on every package respecting which the prescriptions of the ordinance may not have been observed.

Secretary Manning has decided to grant the request of the Cunard Line and the General Transatlantic Line to be allowed to land passengers at their new piers in New York, in place of the Barge Office. This practically ends the delay and annoyance lately suffered under the Barge Office regulations.

The New York Aqueduct Board have decided to adopt the route proposed by the Park Commissioners for the line of the new aqueduct in Central Park, namely, along Eighth avenue to Ninety-seventh street, and then under the transverse road to the reservoir.

At the meeting of the Suez Canal Company held at Paris on the 4th of June, M. Ferdinand de Lesseps reported the receipts for the year 1884 as 65,408,204.56 francs, the expenditures as 30,336,443.63 francs, leaving a profit of 35,071,850.93 francs, from which a dividend of 62.25 francs per share has been declared.

A statement of exports of mineral oils during May, issued by W. F. Switzer, chief of the Bureau of Statistics, gives the following totals:

	Gallons.
Crude mineral oils	5,884,371
Naphtha	1,201,049
Illuminating oils	42,057,023
Oil-making and paraffine oils	1,452,654
Residuum	1,339,986
Total	52,121,976

The valuation is placed at \$4,504,002, against \$4,072,761 in May, 1884.

Somebody is comparing the size and cost of the Great Eastern and Noah's Ark. The cost of building and launching the Great Eastern was \$3,650,000, and this broke the original company. A new company was formed which spent \$600,000 in fitting and furnishing her. Then this company failed and a new company was organized with a capital of \$600,000. At the close of 1880 this company sunk £86,715 upon the vessel, thus making her total cost \$4,703,575. Nothing ever built can stand comparison with the Great Eastern excepting Noah's Ark, and even this vessel could not match her. The length of the Ark was 300 cubits, her breadth 50 cubits, and her height 30 cubits. The cubit of the Scriptures, according to Bishop Wilkins, was 21<sup>15</sup>/<sub>60</sub> inches, and computed into English measurement the Ark was 547 feet long, 91 feet beam, 54<sup>17</sup>/<sub>60</sub> feet depth and 21,762 tons. The Great Eastern is 680 feet long, 53 feet beam, 50 feet depth and 28,003 tons measurement. So Noah's Ark is quite overshadowed by the Great Eastern.

We see it stated that two locomotives built in Paterson were recently put in competition on the Buenos Ayres and Pacific Railway, in the Argentine Republic, with two made in Newcastle, England. The result was a decided victory for the Paterson locomotives, both as to speed and in hauling freight. The entire road, 500 miles long, will be equipped with Paterson locomotives.

The Toronto Bolt Works were burned on the 4th inst., entailing a loss of \$100,000. The works were not in operation.

Arthur T. Hadley, the new Commissioner of the Bureau of Labor Statistics in Connecticut, has left New Haven and established an office at Hartford. Professor Hadley will issue a circular to the effect that the bureau will welcome information regarding earnings and health of the working classes, wages, profits and expenses, hours of labor, organization of labor and capital, strikes and how they were averted, accidents in factories, effects of factory labor on the health of the operatives, employment of children, condition of the workingmen's homes and other similar matter.

Apropos of the anarchical condition of things in Chicago consequent upon the car-drivers' strike and their practical defiance of the authorities, Judge Allison's recent decision at Philadelphia in the "loom-fixer strike" riot case is to the point. Addressing these strikers, he reminded them that (we quote) "this country is free enough for any person to work for any compensation he sees fit to take. That is every man's moral and legal right. No set of workingmen have a right to interfere with another set because the latter choose to work for wages that are not satisfactory to the former. The law does not allow such interference, and if it is attempted with violence the law will stop it. Such interference is tyranny, and of the worst kind, for it is tyranny without the forms of law, and carried out by mere force of numbers."

The Central Labor Union of New York and Chicago propose to co-operate in sending to the Paris Workingmen's Exposition specimens of the handiwork of their members. The exhibition takes place in September, and is open to workingmen in all parts of the

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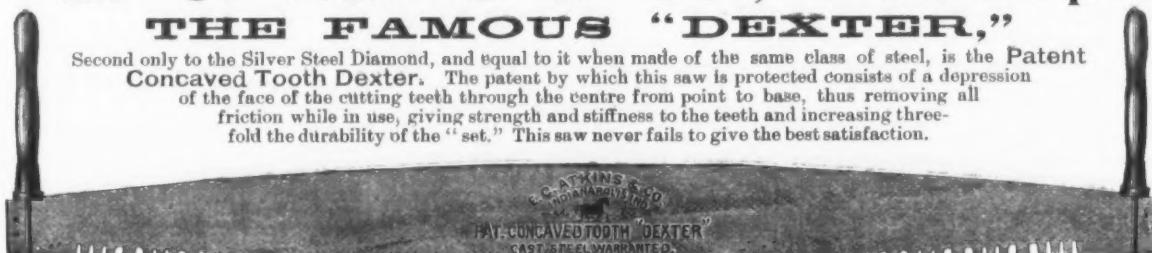
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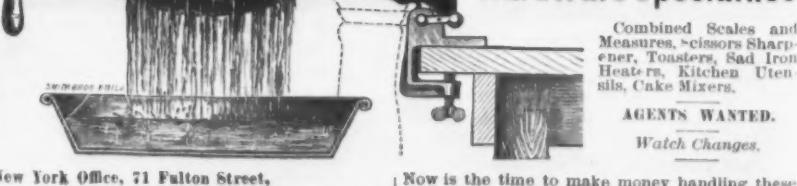
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## Experiments with Bolts and Screw-Threads.\*

BY MAJOR WM. R. KING, U. S. A.

My attention was drawn to this subject just 20 years ago this month, when I was detailed to rebuild one of the bridges in Richmond that had been burned during the evacuation. We took possession of the Tredegar Iron Works, rolled the iron for the bolts and rods, made castings from old shell and other scrap, borrowed the necessary timber from the remains of the navy yard, and rebuilt Mayo's Bridge, 1400 feet long, in about six weeks, the soldiers doing most of the work. Although I had taken special pains in proportioning the bridge, and had introduced what Holley has designated as a suitable "factor of ignorance," I was not at all satisfied of the stability of the bridge when completed, on account of the evident weakening of the principal rods by cutting coarse "standard" threads upon them, and I was greatly relieved of anxiety when a few years later an unprecedented flood in the James River picked up that bridge and carried it bodily out upon the bosom of Chesapeake Bay.

The matter was again forcibly suggested a few years later when investigating the sub-

much too coarse for nearly all purposes, and that the size of nuts was out of all proportion to the strains upon them, since the bolts themselves would invariably break long before the thread or nut would yield. These facts were briefly set forth in "Professional Papers No. 17," printed in 1870, and the practical tests now made have fully verified the conclusion then reached. Four test bolts were made. They were all from the same quality of wrought iron and were forged at the same time. The shanks of the bolts were turned and the heads and nuts were faced up in the usual way, the outside of heads and nuts being left in a rough state. No special care was taken in fitting the nuts. Two of these bolts had the standard threads of six to the inch, and two had 12 to the inch, and all the heads and nuts were made about two sizes lighter than the tables prescribe for 1½-inch bolts. As the fine thread weakens the bolt much less than the coarse one, and must be proportionately stronger, the principal questions to be settled were whether the thread of the fine-cut bolts would strip or the head or nut would give way before the bolt itself would break.

These questions were definitely settled by having the bolts carefully tested on the Government testing machine at the Watertown Arsenal, which was done by the courtesy of Major F. H. Parker, United States Ordnance

corresponding stretch of the six bolts, and for comparison therewith, a diagram enlarged from an autographic sheet (similar to an indicator diagram), taken in 1870, which is thought to be the first attempt ever made to get a continuous record of the behavior of iron under varying strains.

The standard bolts broke at an average strain of 76,655. Those with 12 threads at 94,218. It will be noticed that the latter were just on the point of breaking when the nut pulled off.

	6	12	18
threads. threads. threads.			
Relative tensile strength.	1	1.21	1.23
Stretch.	.025	.06	.08
Relative work.	.025	.0726	.0984
Or.	1	2.9	4

The advantages sought are:

1. At least 20 per cent. additional statical strength.
2. Three or four times the strength to resist impact.
3. Easier to cut.
4. Less liable to work loose.
5. In many cases it will take the place of upset or enlarged bolt-ends.
6. In such cases it would have the advantage of filling the hole, or, rather, it would avoid the necessity of making the holes larger than the body of the bolts.
7. A saving of 50 or 60 per cent. in weight of heads and nuts; also in cost.
8. Bolts may be placed closer to angles in structures without chipping out for head or nut.

The disadvantages would be:

1. Cost of changing taps and dies.
2. Additional time required to put on or remove nuts, which, of course, is hardly worthy of notice.
3. In case of bolts frequently removed there would, of course, be a greater loss in

well afford to buy up all the old taps and dies at their weight in standard silver dollars and destroy them just as they do obsolete dies at the mints. Some might think it best to wait for the adoption of the metrical system before taking action in this matter, as another change would, of course, be necessary in that event, but I think this would be a mistake. The metrical system is making very slow progress in this country, and its practical use would reach everybody and send them back to their schoolbooks, while this change would simply affect manufacturers of machinery, &c., and only require changes in tables, gauges and other special tools.

If any reliable person should claim that he had discovered a method of saving 10 per cent. in the cost of producing pig iron it would arrest the attention of the entire pig-iron community, but I doubt very much whether a positive demonstration, both theoretical and experimental, that a saving of 20 to 60 per cent. can be made in the cost of more highly wrought or finished work, like bolts and nuts, will attract enough attention to secure even a fair investigation of its merits. I should feel more hesitation in advocating reform of so ancient and conservative an institution as the standard of bolts and screw-threads if it were not for the fact that the world is full of just such antiquated humbugs. Take the Birmingham wire gauge for example, or our system of weights and measures, with two or three different pounds and tons, and no system whatever in fixing the ratios between units of different orders.

The standard for threads, which I have indicated by a broken line (see Fig. 3) with a diagram of pipe-threads and the Franklin Institute Standard, is merely suggested for consideration, and, of course, should not be adopted without careful experiment with all sizes of bolts, to see that the figures given are those best suited for each bolt. I have

had an 18-inch train, three-high. The 24-inch train in the plate mill is driven by an engine of 500 indicated horse power, this mill rolling all thicknesses from 1-inch plates down to 30-gauge sheets. The bar mill has a 16-inch train, three-high, and rolls rounds 1½ inches up to 5 inches. There are two 8-inch mills rolling rounds from 1/8 inch up to 1½ inches, and flats 1½ inches up to 8 inches. Angles up to 4½ inches are also made, and light rails. The floor of the plate mill is formed of perforated cast-iron slabs 30 inches square and 3 inches thick, laid on cast-iron beams. The bar-iron mill has a similar floor for straightening. The works have been well laid out, and the machinery appears to be in good order and well managed. When fully engaged 500 men find employment.

## Steel in Structural Work.

The *Railway Register* glories in a contributor whose special mission seems to be to run down steel as a material for many varieties of structural work. While it would not be wise to indorse blindly all the claims made in behalf of steel, attacks upon that material cease to command respectful hearing when they clearly reveal ignorance on the subject. We submit the following as an example of the metallurgical lore of the anti-steel Quixote of the *Railway Register*:

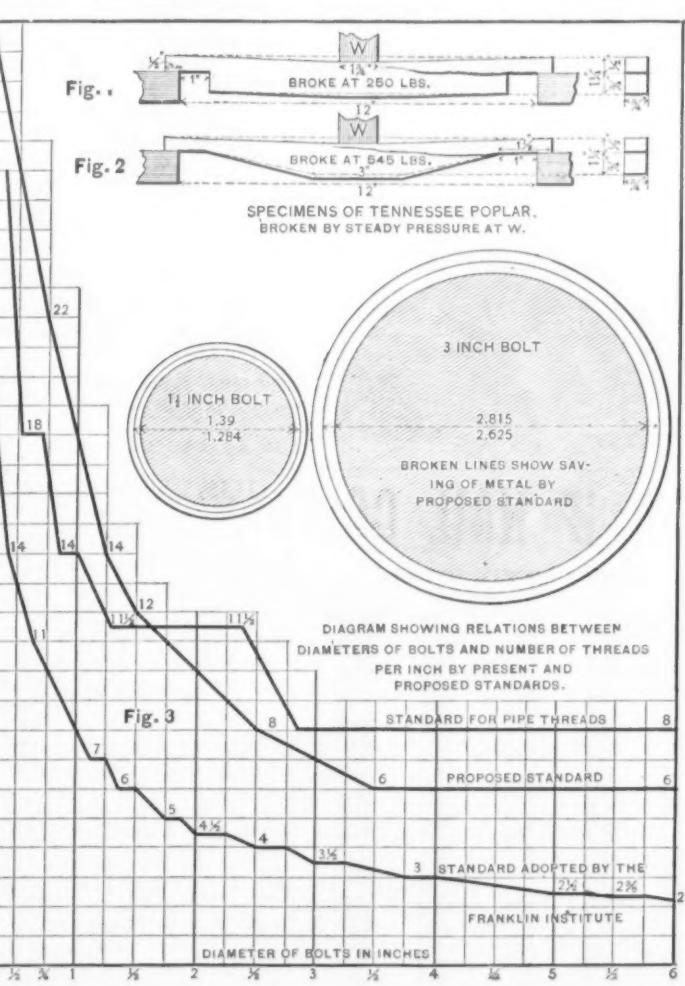
"The reliability of steel plates in boiler service is daily becoming more a question of doubt than ever before. The first and most serious objection urged against them was the tendency to crack and fracture. An investigation by the manufacturer into the causes gave conclusive evidence of superabundance of carbon in the metal. The pressure upon all sides from consumers made it absolutely necessary that a remedy should be found for this evil, and that without delay. The skill of the chemist was brought into requisition, and a product containing greater proportions of manganese, silicon and other ingredients, tending to give ductility and elongation under a cold test, were added to the mixture, and the elements which produced carbon were proportionately reduced. As a consequence we find 'mild steel,' 'ingot iron' and numerous other products being crowded upon the market, and at the same time lauded in a most extraordinary manner. A result of reducing the carbon and increasing the other ingredients has been to lower the fusing point of the plate, and now it is quite frequent that we hear of steel boilers bagging down either upon an outside sheet in a stationary boiler or upon the crown sheet of a locomotive fire-box."

## Driving Stone Headings Without Explosives.

In driving a stone drift at the Bois de Boisau Colliery, in the Mons district, Belgium, the strata was found to be so charged with fire-damp that it became impossible to continue the use of explosives. Recourse was therefore necessarily had to other means of carrying on the driving. The system adopted has shown itself to be adequate to the circumstances of this case, and is worthy of mention as a successful solution of a somewhat difficult problem. The rock was a very hard grit, lying in horizontal beds. A machine drill, of the Dubois & François type, was employed on the face of the heading in the following manner: Across the middle of the face a row of holes was bored, from 3 to 4 inches in diameter and 3 feet deep, the distance of the holes apart being from 5 to 6 inches. When all these holes had been bored a special tool was substituted for the drills, having a rectangular striking surface 6 inches long by 2 inches wide, and provided with teeth like a saw. By means of this tool the rock left between the holes was cut through, leaving a horizontal groove, varying in width from 2 inches to 6 inches, and of a depth of 3 feet, extending across the face of the heading. This groove was intended to serve the same purpose as the "holing" or undercutting in coal. Other holes of smaller diameter were then bored above and below the groove, and in greater or less proximity to it, according to the strength of the rock. Conical iron wedges of slow taper, placed in these holes and driven in by the machine drill, provided with a hammer for the purpose, broke down the rock between the holes and the groove. These operations were continued until the whole face had been brought down, when an advance had been made of about 2 feet 8 inches. This advance varied with the nature of the ground, and still more with the skill of the workmen, who did not attain to the average length of 2 feet 8 inches till after they had acquired considerable experience in this system of working. The shifts, which were of eight hours, consisted of three men, one in charge of the drill, and two laborers. The driller worked 18 consecutive hours. The average rate of progress made under these conditions was 8 feet 2½ inches a week, the section of the heading being 6 feet 11 inches by 7 feet 2½ inches. When the special difficulties of this driving are taken into account, this rate of progress must be considered satisfactory.

**A Novel Method for Cutting Glass Tubes.**—Electricity has now been applied for cutting glass tubes—an operation of some difficulty when the diameter is large. The *Journal of the Society of Arts* says: "An iron wire ½ mm. in diameter is wound round the tube at the place required to be cut, and the ends are connected by means of copper conductors, of the same diameter, with the poles of a powerful battery or other generator of electricity. This iron becomes heated when the current flows, and it is only necessary to cool it suddenly with a few drops of cold water in order to produce a clear cut. Glass tubes 4 inches in diameter are now cut in this way."

A Memphis dispatch reports that a contract has been made between the Alabama Improvement Company and a Mr. Harvey, of New York, for building (by the latter) a railroad between Sheffield and Birmingham, 130 miles. The contract provides that the first 45 miles from Sheffield must be completed by the 1st of July, 1886. The road, when completed, will give an outlet by way of the Tennessee River at Sheffield to the iron manufacturers at Birmingham.



EXPERIMENTS WITH BOLTS AND SCREW-THREADS.

ject of armor-plating. It was found that bolts were a great source of weakness, and as a general rule, especially in all the earlier experiments, when any of the armored targets were struck by heavy projectiles the result was a perfect hailstorm of bolt-ends, nuts and washers. In fact, it may almost be stated as a rule that in all similar engineering work the bolts are the weakest part of the structure. This is perhaps due to the fact that we almost always look at the side rather than at the end of a bolt, which makes about 30 per cent. difference in the apparent strength. In order to strengthen a chain we must strengthen the weakest link, and as cutting away too much metal for the screw-thread weakens bolts, which in turn are themselves sources of weakness, it is evident that we must begin at the thread. If the thread is cut deeper than is required to prevent stripping, it must weaken the bolt and in a most insidious way, for it is the very method taken by the blacksmith to break iron or steel bars, and it should be noted right here that the standard thread is cut much deeper than the blacksmith nicks his bars.

Without going into the mathematical work by which the facts were proved, it may be stated that, in connection with the armor-plate investigations already referred to, I found theoretically, first, that with a perfectly fitting thread it makes no difference in regard to the strength of a bolt-thread how fine it is made, since the length of thread necessarily at their weakest point, and I can only account for it upon the theory that the present scales have been inherited from the coarse blacksmith work of former years which has been carried into our modern and more refined practice to avoid changing taps and dies.

It should be stated that the outside of the thread in all these bolts was 1/8 inch smaller than the body of the bolt, or the latter would have shown greater elongation. To test the matter still further, I have recently had three more pairs of bolts made, one pair having 6 threads, one 12 threads and one pair 18 threads to the inch; but in all other respects the bolts were as nearly alike as it was possible to make them. They were turned from bar iron 1 1/2 x 2 inches square, so that no forging was required (see Fig. 5). The results were still more favorable for the fine thread, for when broken in a hydrostatic press not a single nut showed signs of weakness, and the bolts with 18 threads to the inch showed unmistakably that they were stronger than the others, although they finally broke by pulling out of the nut—not by stripping the thread, as we generally understand it, but by actually drawing down the size of the bolt until the greater part of the threads were disengaged, as can be seen from the specimens.

## EXPERIMENTS WITH SCREW-THREADS AND NUTS.

Having occasion to use a large number of screw-bolts in building iron lock gates for the Muscle Shoals Canal, my attention was again directed to the proper proportions of threads and nuts. About 14 years ago, while experimenting with materials for armor-plating, I became convinced that the "standard" sizes for V-shaped threads were very

\* From a paper read at the Chattanooga meeting of the American Institute of Mining Engineers, May 15, 1885.

strength from wear and rust of surfaces of thread. We have seen, however, that this wear must go on until the No. 12 thread is as fine as the No. 18 thread before the nut will strip. In some cases, like the bolts that secure the cylinder heads of a steam engine, it will probably be best to retain a coarse thread.

The great excess of strength in the ordinary screw-thread is evident from the experience with French breech-loading guns, where the enormous strain due to the explosion of the charge is held by only a fraction (considerably less than one-half) of the threads, the balance being either cut away or not engaged. In a 16-inch rifle, e. g., the strain on the breech plug is about 4000 tons. The advantage of having every part of a structure of a strength proportional to the strain upon it is not generally appreciated. The "Deacon's One-Horse Shay" was more of a reality than is generally understood. A beam may be actually strengthened by cutting away portions of it (see Figs. 1 and 2). Here are two little wooden beams, for example, that show the strength of a beam may be more than doubled by cutting away surplus timber, and leaving all parts strong in proportion to the strain they are required to resist. The same principle applies to bolts. Although the cost of changing to the proposed system would be very great, I believe the country could

endeavor, without attempting any great nicely, to fix upon the simplest combinations of numbers that will give about double the standard number of threads to the inch and avoid fractional numbers of threads, so far as possible.

Instead of introducing such complications as 2 1/2 or 2 1/2 threads to the inch, I would suggest that whole numbers be fixed for each 1/4 inch of bolt diameter, and then let all intermediate sizes of bolts have the same number of threads as the bolt next below it in size. Having found considerable fault with the "machine" as it exists, suggested "bolts," and urged "reform" with some considerable pertinacity, I might perhaps be set down as a "crank" or mechanical "mugwump" but for the fact that you allow no political discussions in your society.

The Birmingham Rolling Mill Company are situated close to the town, in the angle formed by the tracks of the Alabama Great Southern and the Louisville and Nashville crossing. Here bar, plate and sheet iron are rolled in great variety, the present capacity being about 500 tons per week. There are 2 single and 10 double puddling furnaces, 1 sand-bottom scrap furnace, 2 heating furnaces with bar mill, 1 heating furnace with guide mill and 2 furnaces with plate mill. The plate mill has also a sheet furnace and two annealing ovens. The puddled bar mill

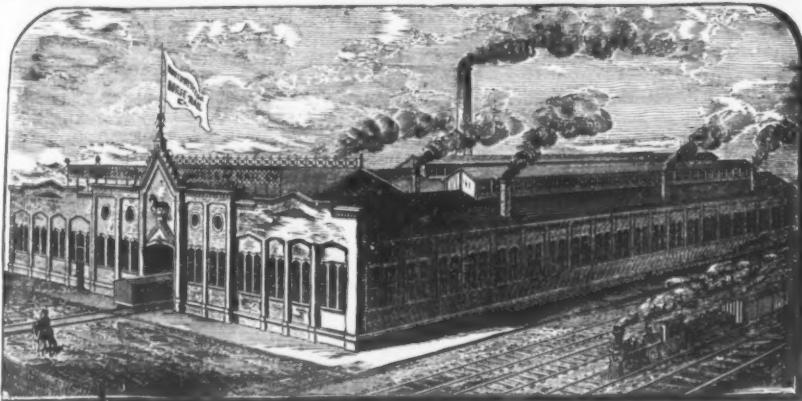
has an 18-inch train, three-high. The 24-inch train in the plate mill is driven by an engine of 500 indicated horse power, this mill rolling all thicknesses from 1-inch plates down to 30-gauge sheets. The bar mill has a 16-inch train, three-high, and rolls rounds 1 1/2 inches up to 5 inches. There are two 8-inch mills rolling rounds from 1/8 inch up to 1 1/2 inches, and flats 1 1/2 inches up to 8 inches. Angles up to 4 1/2 inches are also made, and light rails. The floor of the plate mill is formed of perforated cast-iron slabs 30 inches square and 3 inches thick, laid on cast-iron beams. The bar-iron mill has a similar floor for straightening. The works have been well laid out, and the machinery appears to be in good order and well managed. When fully engaged 500 men find employment.

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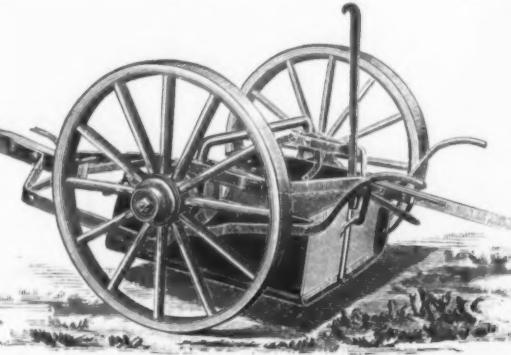
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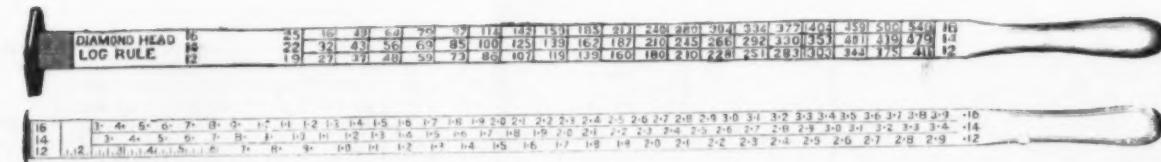


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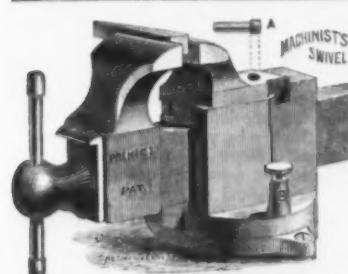
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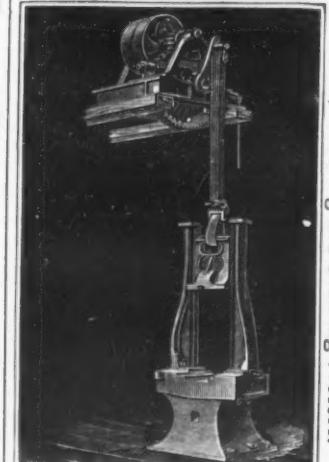
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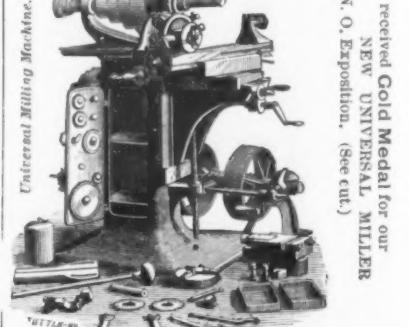
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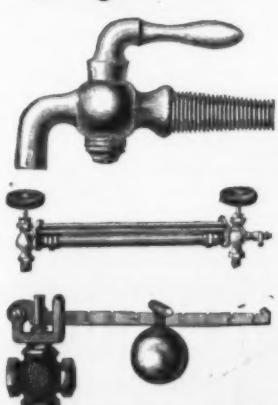
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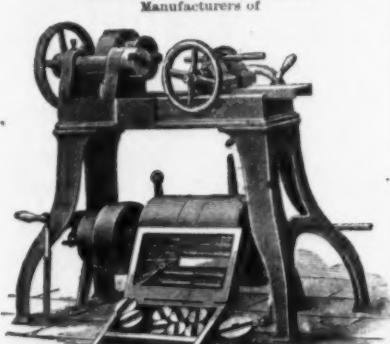
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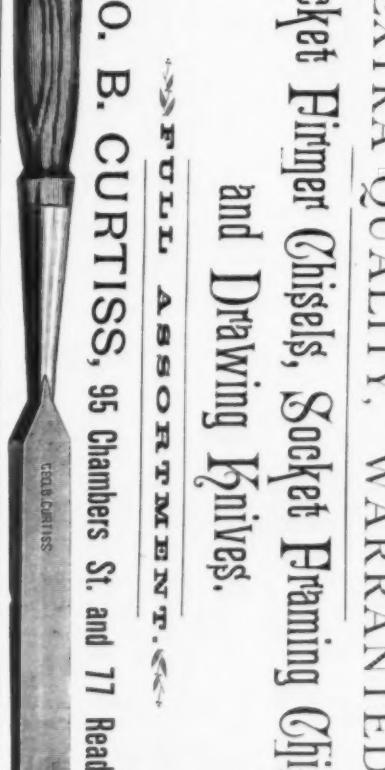
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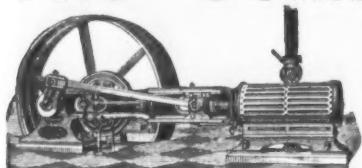
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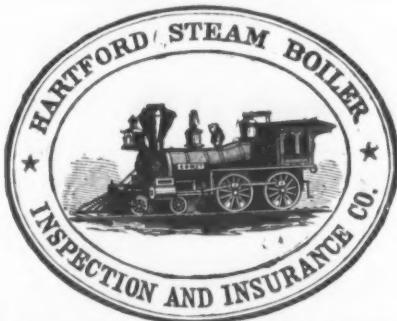
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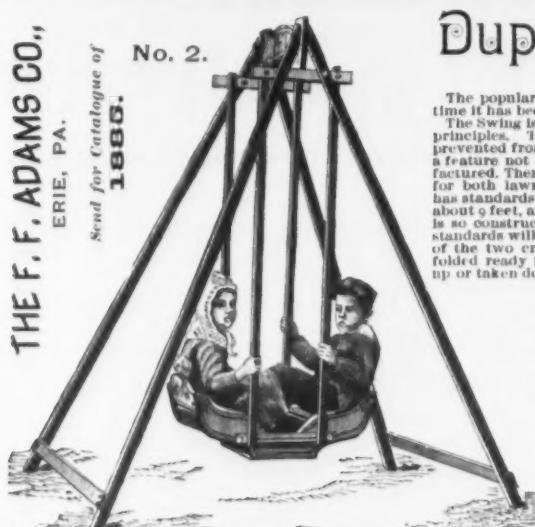
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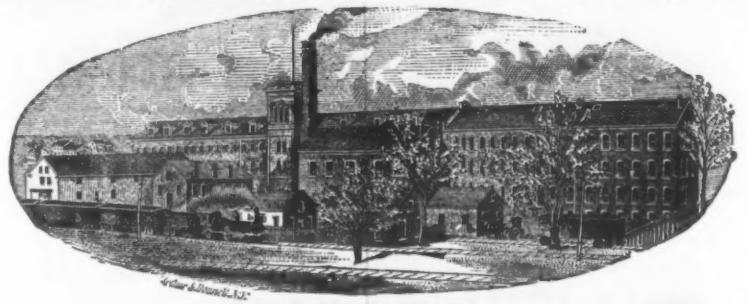
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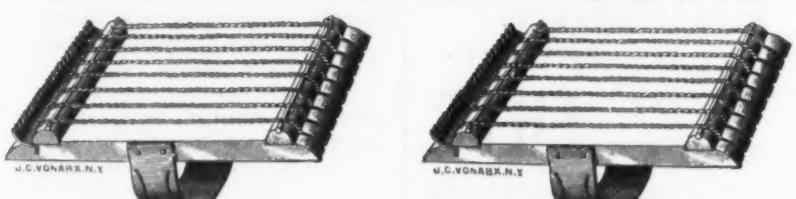
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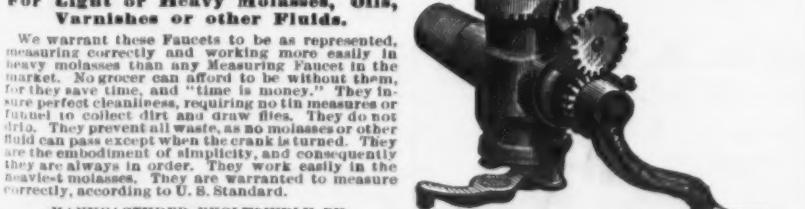
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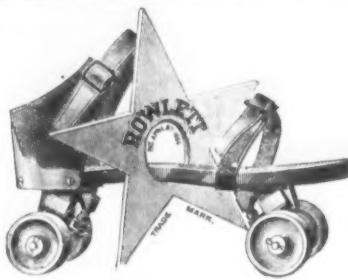
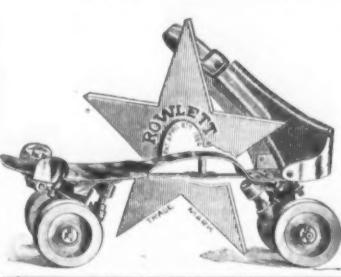
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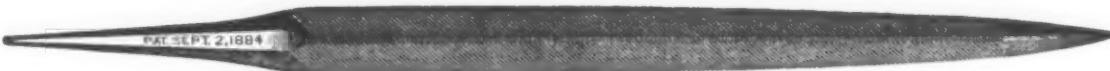
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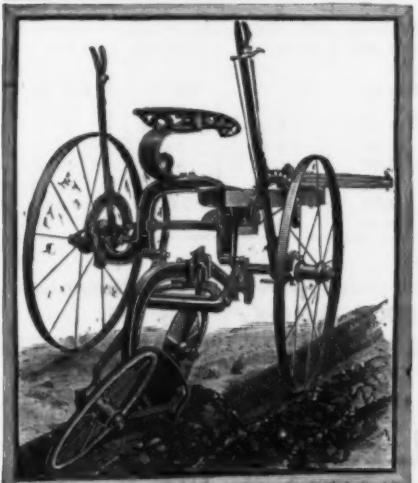
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Pipe-Cutting Machines,

MANUFACTURED BY

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243 & 245 South Third St.,  
PHILADELPHIA,

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EFFICIENT,

POWERFUL,

CHEAP

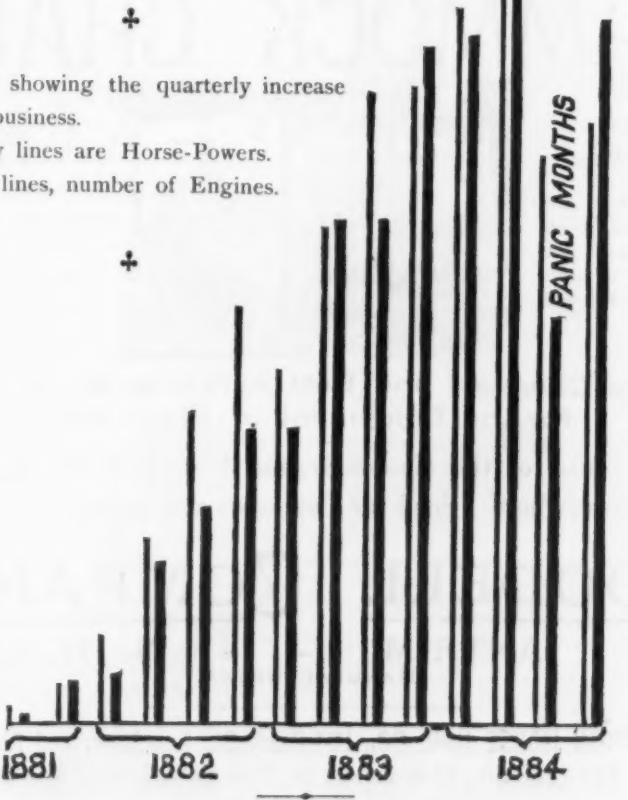


## The Westinghouse Engine

Chart showing the quarterly increase  
of our business.

Heavy lines are Horse-Powers.

Light lines, number of Engines.



## SOME FACTS.

Up to May 1st, '85, TWENTY-ONE PER CENT. of our sales have been *bona fide* REPEATED ORDERS (2 to 12) from actual users (not agents), and do not include about twenty-five exchanged engines, all of which are consumed as single sales. About half of the exchanges were from defective engines for increased power or automatic cut-off, the difference being paid in many cases. From \$6 to \$100 have displaced other engines. On the contrary, we know of but three parties who, having bought one Westinghouse Engine, have failed to give it up in subsequent orders. We have learned of but six second-hand engines being offered for sale, all of which were either from fire or failures. Nine engines (our earliest) were thrown back on our hands altogether. This is our record, with about 1500 engines running.

SEND FOR ILLUSTRATED CIRCULAR AND REFERENCE LIST.

## The Westinghouse Machine Co., PITTSBURGH, PA.

SALES DEPARTMENT CONDUCTED BY

WESTINGHOUSE, CHURCH, KERR & CO., 27 Cortland Street, New York.  
FAIRBANKS, MORSE & CO., Chicago, Cincinnati, Cleveland, Louisville and St. Paul.  
PARKE & LACY, San Francisco, and Portland, Oregon.  
PARKE, LACY & CO., Salt Lake City, Utah and Butte, Montana.  
D. A. TOMPKINS & CO., Charlotte, N. C.  
KEATING IMPLEMENT & MACHINE CO., Dallas, Texas.  
ROBERT MIDDLETON, Mobile, Ala.  
H. DUDLEY COLEMAN, 9 Perdido Street, New Orleans, La.  
IMRA & CO., Sydney and Melbourne, Australia.  
R. ROGERS, 43 Rue Lantin, Paris.  
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## PHILADELPHIA.

*Floyd & Supplies Hardware Co.*  
Terms, 60 days. For 60 or 90 days, interest added at 8 per cent, per annum.

**Anvils.**  
Peter Wright's,  $\frac{1}{2}$  b. 96<sup>1/2</sup> 186<sup>1/2</sup>  
Trenton,  $\frac{1}{2}$  b. 96<sup>1/2</sup> 186<sup>1/2</sup>  
Eddystone, American, 10<sup>1/2</sup> b. 100<sup>1/2</sup>

**Apple Parers.**  
Penn Apple Parers, 5.50 net

White Mountain, 5.50 net

Lots of 10 to 25 dozen, special prices.

**Axes.**  
Hunt's Kentucky and Yankee,  $\frac{1}{2}$  b. net, 40<sup>1/2</sup> 67.00

William Mann,  $\frac{1}{2}$  b. net, 40<sup>1/2</sup> 67.00

Favorite,  $\frac{1}{2}$  b. net, 40<sup>1/2</sup> 67.00

Double Bit Axe,  $\frac{1}{2}$  b. net, 41.00

**Augers and Auger Bits.**—New List January 7.

Smith's Augers and Bits, 5.50 net

New Haven Copper Company, 5.50 net

Benjamin Pierce Auger Bits, 4.00 net

Jennings' Auger Bits, new list, Jan. 1, 1884, 4.00 net

Cook's Auger Bits and Augers, 4.00 net

Watson's Ship Augers, 4.00 net

Bonney's Pat. Hot. Augers, list \$48 per doz., 40<sup>1/2</sup> 108.00

Stearns Pat. Hot. Augers, list \$48 per doz., 40<sup>1/2</sup> 108.00

**Balances.**  
Scales and Common, 4.00 net

**Bells.**  
Revin Bros. Mfg. Co. Light Hand Bells, 4.00 net

Light Hand Bells, 4.00 net

Small Hand Bells, 4.00 net

Connell's Door Bells, 4.00 net

GL. Western & Kentucky Cow, new list, 4.00 net

**Boring Machines.**  
Upright, with Augers, 5.50 net, 40<sup>1/2</sup> 108.00

Augers without Auger Custers, 5.50 net, 40<sup>1/2</sup> 108.00

**Bolts.**—Eastern Carriage Bolts, new list, June 10, 1884

Philadelphia Carriage Bolts new list, 40<sup>1/2</sup> 108.00

Stewart, Weller & Co., 4.00 net

Brace—Barney's Improved, 5.50 net

Barber's Old Style, 5.50 net

Buckus, Polished, 5.50 net

Bronze, Nickelated, 5.50 net

Spofford, 5.50 net

American Ball, 5.50 net

Amidon Improved, 5.50 net

Amidon Corner Brace, 5.50 net

Burton's Joint, John Narrow, 5.50 net

Cast Fast Joint, Heavy, 5.50 net

Cast Loose Joint, Narrow, 5.50 net

Cast Loose Joint, Broad, 5.50 net

Cast Acorn, Loose Pin, 5.50 net

Cast Caster, Loose Pin, 5.50 net

Cast Mayer's Loose Joint, 5.50 net

Wrought Loose Pin, 5.50 net

Wrought Table Hinges and Back Flaps, 60<sup>1/2</sup> 108.00

Wrought Loose Joint, 60<sup>1/2</sup> 108.00

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**Blind Bolts.**

Parker, 5.50 net

Clark, 5.50 net

Shoar, 5.50 net

Lull & Porter, 5.50 net

Huffer's, 5.50 net

**Casters.**—New List July 1, 1880, 4.00 net

Casters, German Hailer and Coll., list June 1884, 4.00 net

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Best Proof Coil Chain, English, 5.50 net

3-10 1/4 5-15 5-18 7-16 1/2

Chisels, Socket Framing, 75<sup>1/2</sup> 108.00

Socket Firmer, 75<sup>1/2</sup> 108.00

Hammer, 75<sup>1/2</sup> 108.00

**Coffee Mills.**—Box and Side view, list Jan. 1, 1880

Enterprise, 40<sup>1/2</sup> 108.00

Cutterly, Walden Pocket, 4.00 net

Walden Pocket, new list, 4.00 net

Landers, Frary & Clark, J. Russell & Co., Lamson & Goodnow Mfg. Co. and Meriden Cutlery Co., Manufacturers' prices net

**Dresser Boxes.**

Hart Mfg. Co., 5.50 net

Adjustable Handle, 5.50 net

Fry Pans, Tinned, 4.00 net

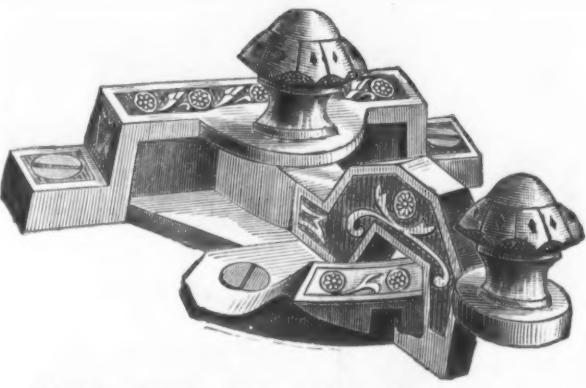
1 doz., \$1.50 4.00 5.50 5.50 6.50 7.50 9.00 10.00

No. 0 1 2 3 4 5 6 7 8

Burnished, 4.00 net

70<sup>1/2</sup> 108.00

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FOR NET BOTTOM PRICES SEE PAGE A.1.  
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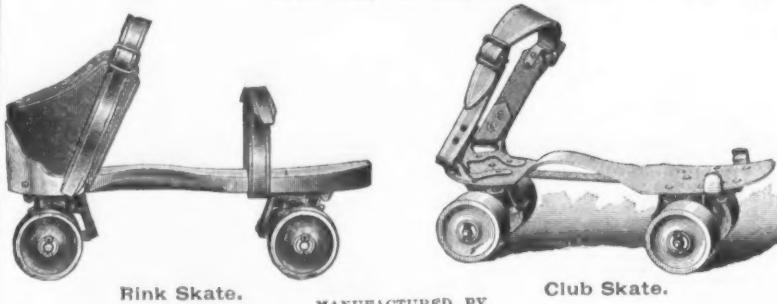
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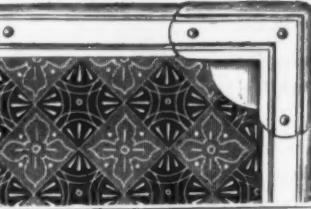
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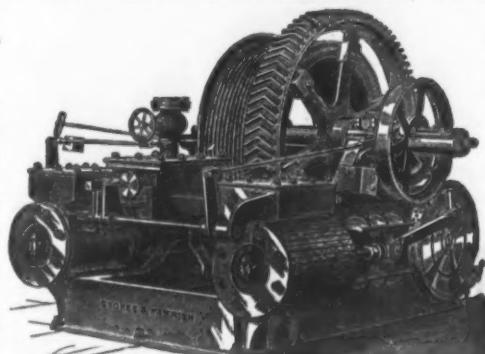
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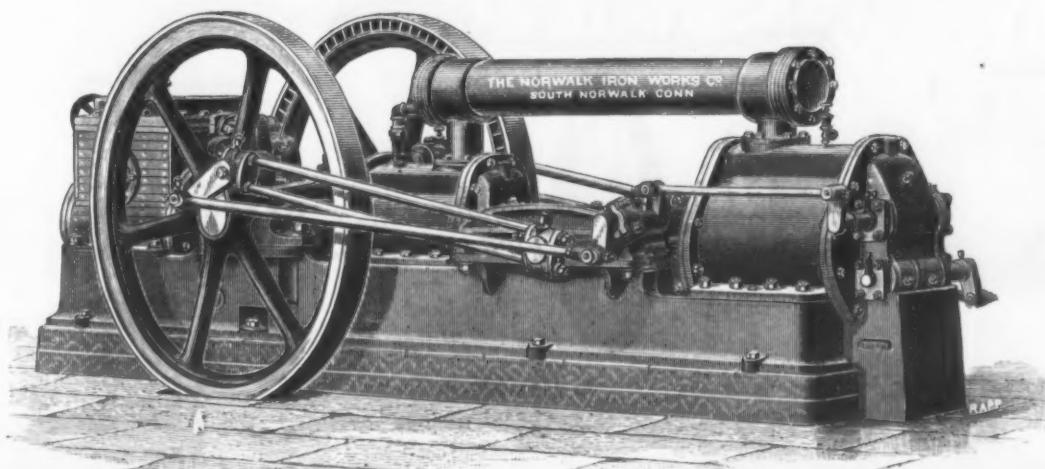
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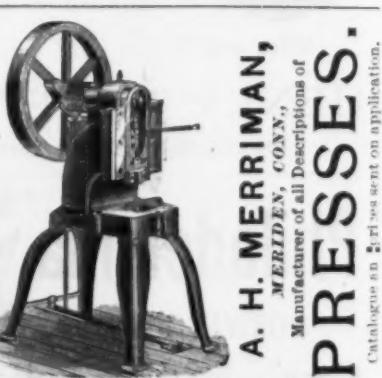
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Manufactured from very best  
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Are accurately pointed, tough, strong  
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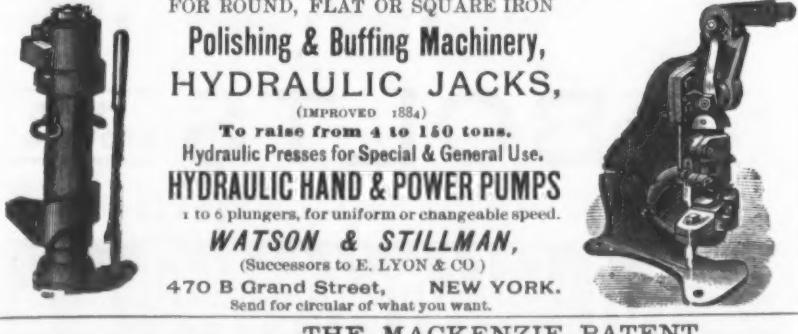
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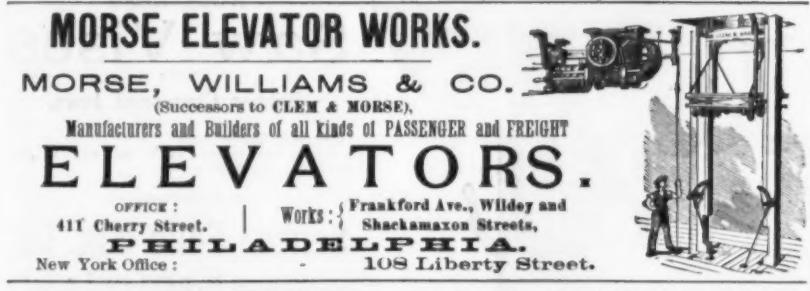
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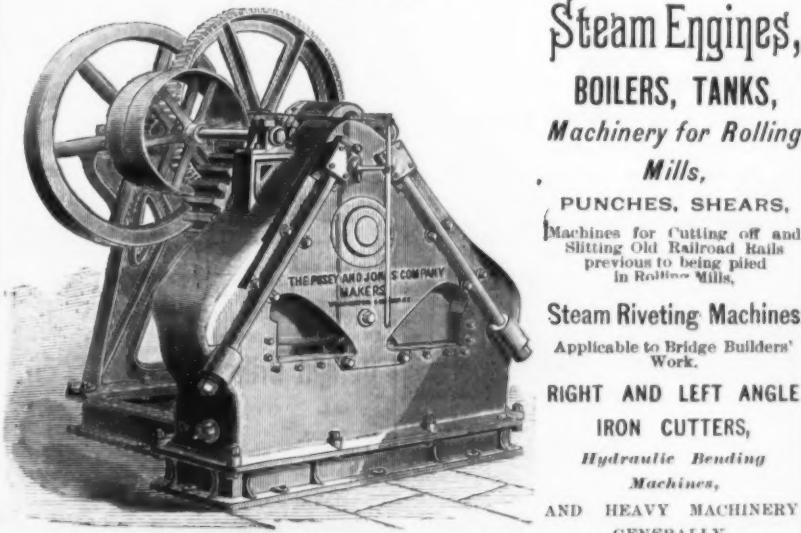
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